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September 1984

RUN

The Commodore 64 & VIC-20 Magazine

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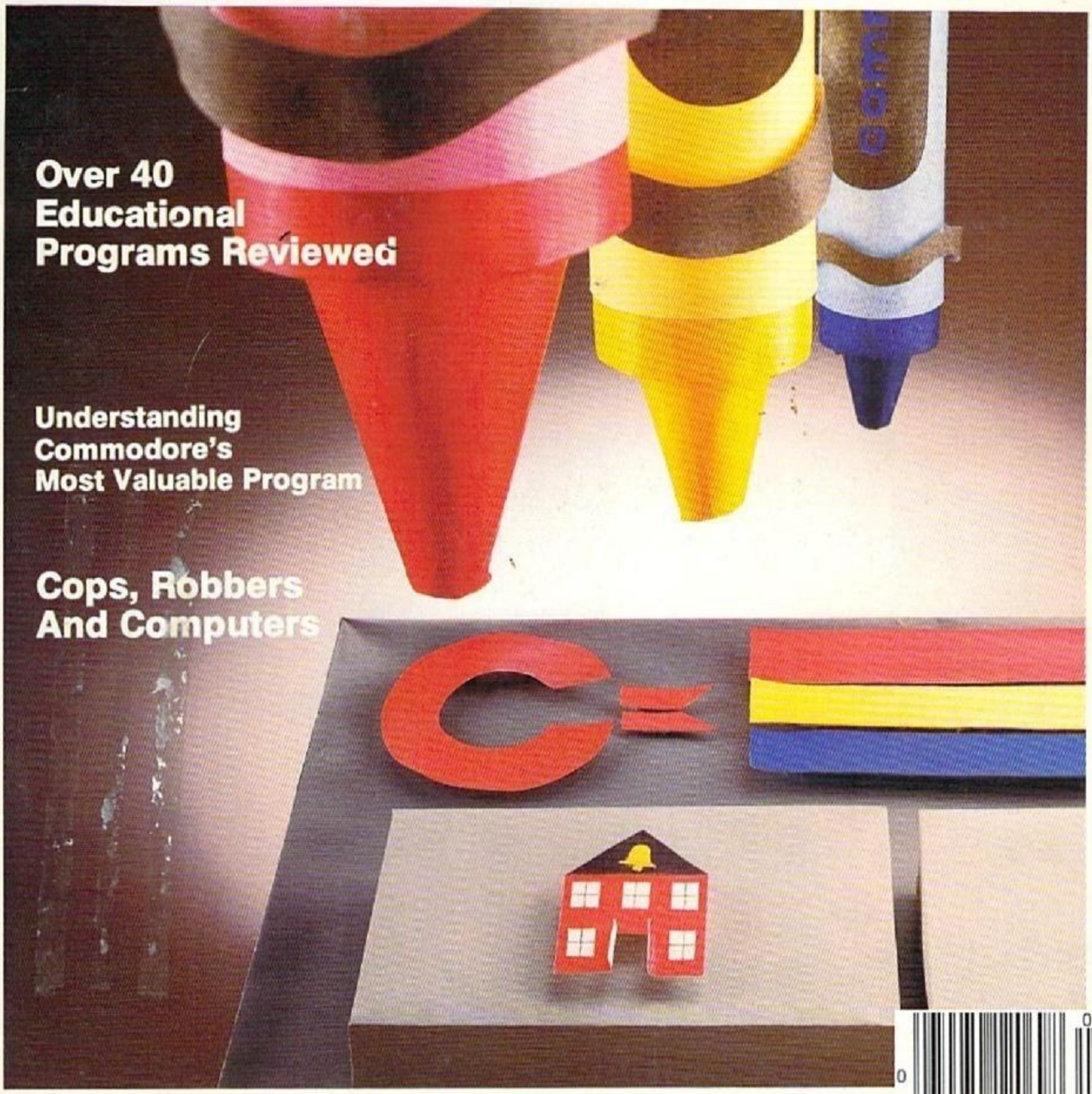
Demystify Your Listings

Changing the Way Your Kids Learn



Over 40
Educational
Programs Reviewed

Understanding
Commodore's
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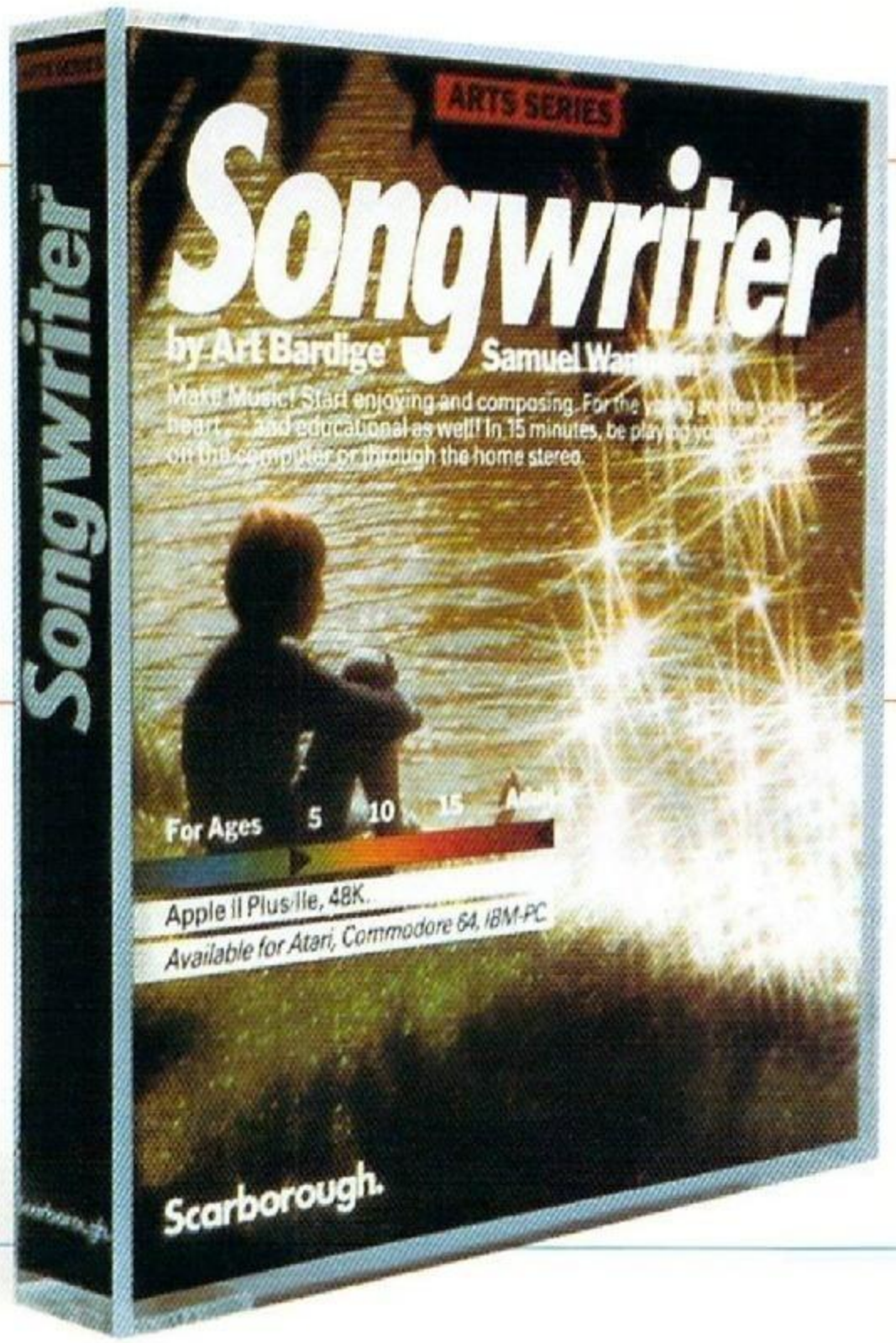

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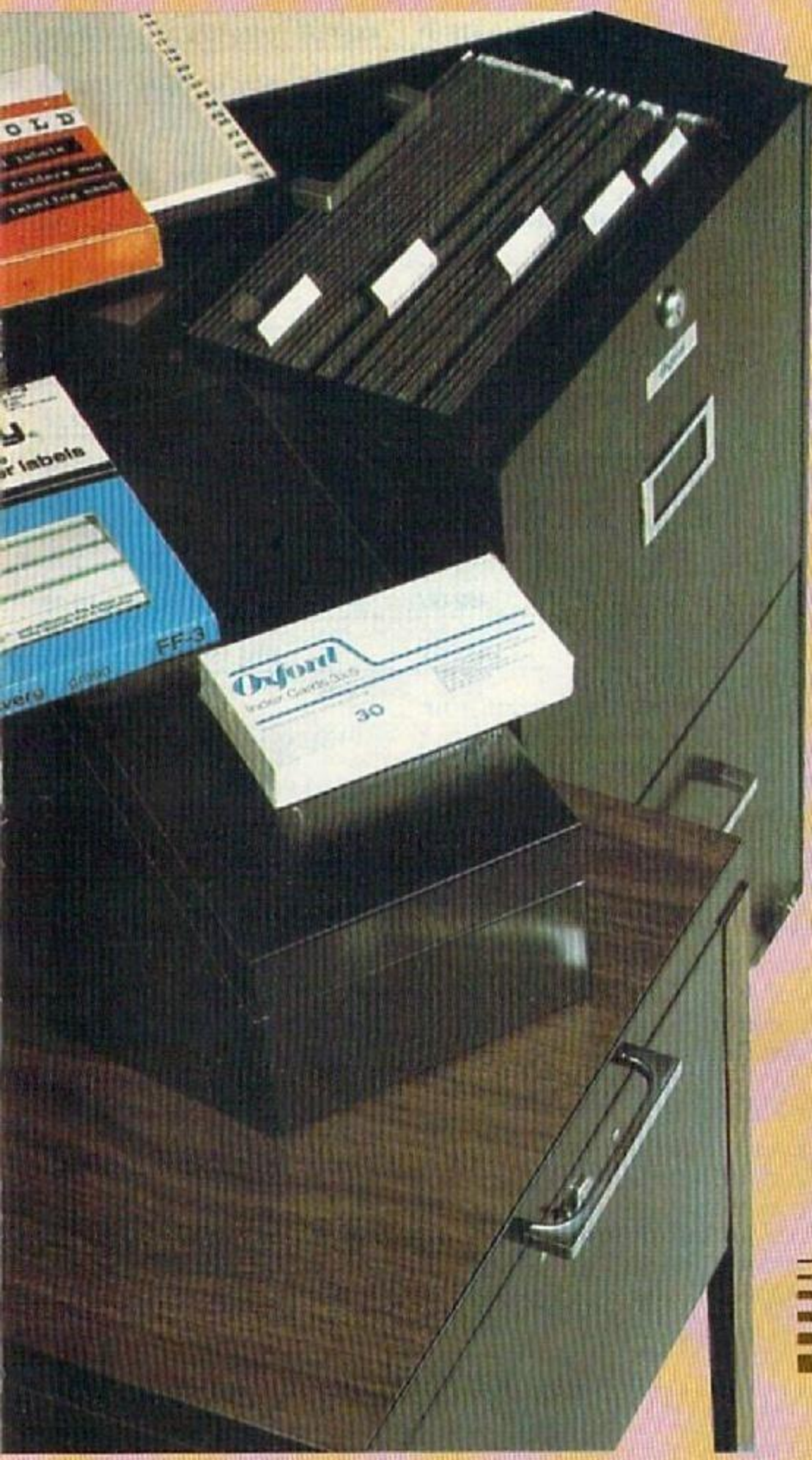
PRO—DATA



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RUN

September 1984
Vol. 1, No. 9

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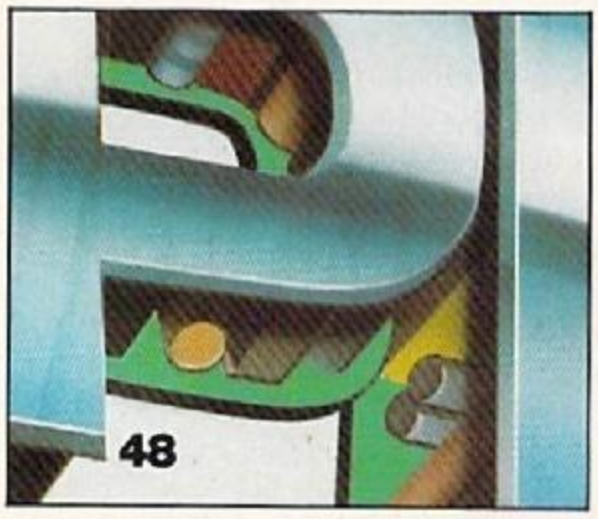
This article reviews over 40 educational programs, available for the C-64, and presents their main features in a convenient chart. *By Neil Salkind*



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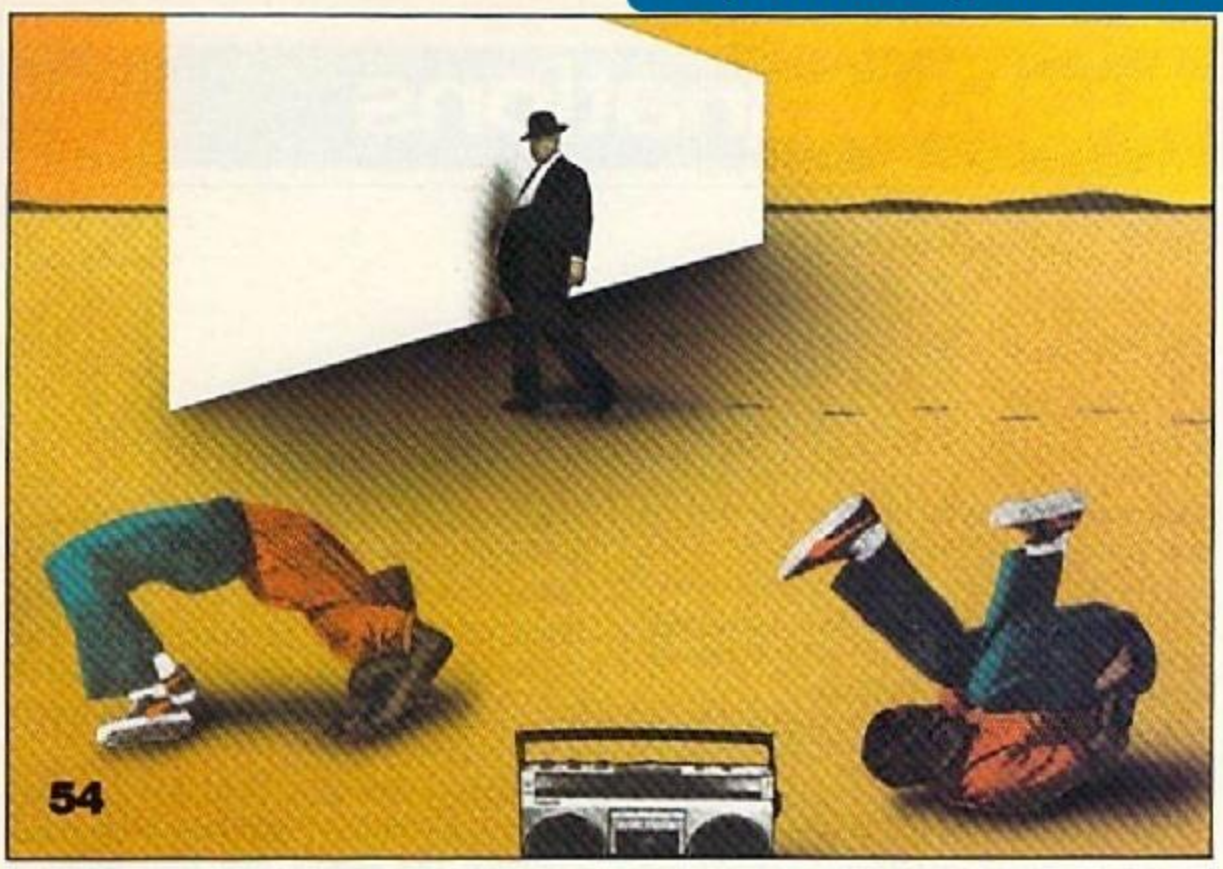

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Sculpture by Sarah E. Werninger
Photograph by Martin Paul Studio
Design by Suzanne Torsheya

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RUNning Ruminations

One of the most striking themes at the recent Summer CES Show in Chicago certainly had to be the abundance of educational software. Many software manufacturers, including several strictly game-related producers, are shifting their emphasis to the educational market.

This bodes well for the consumer, because, as competition heats up for this market, shoppers will find more and better-quality software programs in stock on the shelves of their local software supermarket.

As I was talking to various manufacturers and distributors at the show, I couldn't help but wonder, "Will this emphasis on computers and education help Susie or Johnny become a better student?"

In a column written last year, noted humorist Art Buchwald took a tongue-in-cheek look at a child-parent exchange regarding grades and computers:

"Johnny, where is your report card?"

"Here."

"Why did you get a D in math?"

"Wasn't my fault. You wouldn't buy me a computer."

"We can't afford a computer right now. They cost too much."

"Don't matter to me. The man on TV said if you don't want to give me a head start in life you'll have nobody to blame but yourself..."

"Well, I'm not about to buy you one, so you'd better straighten out and come home with a better report card than this the next time or you can spend your weekends in your room."

"I don't care. I'll probably wind up in jail anyway."

"Who told you that?"

"The guy on TV. He said if parents didn't buy their kid a computer, the kid would probably wind up sticking up liquor stores when he grew up."

Of course, the notion that if you deny your youngster a computer, he or she may become an academic delinquent, or worse, a societal outcast, is ludicrous. By the same token, allowing little Sue or John to use computers won't result in your little tyke becoming an adolescent zombie.

Just like television—that technological marvel that was developed not too many years ago—microcomputers are, by themselves, neither good nor bad. It's how we use them—and how we teach our children to use them—that determines their value.

In this issue, just in time for the return to school, *RUN* focuses on education. In the feature article entitled "Back to Basics," frequent *RUN* contributor Neil Salkind takes a look at more than 40 of the major educational packages available for the Commodore 64. Discussion is mainly limited to educational software for children from pre-school age (about 4–6 years) through the last year of elementary school (around 12–13 years).

Salkind, who is a child-development psychologist at the University of Kansas, examines the impact that well-designed software can have on a child's growth and success in school. In this article he offers the reader some valuable guidelines to follow in selecting the correct software for his child's needs.

RUN, which publishes a bimonthly educational review column, is editorially committed to covering the application of Commodore microcomputers in the classroom.

In this issue we hope to acquaint our readers with some of the capabilities of the educational software on the market today. But be advised that this is only a sampling of the hundreds of programs that are available.

No matter what skills—reading, composition, spelling, shape and spatial recognition—your child needs to develop, there is educational software available to help.

db

How to type listings from *RUN*

Typing in listings can be difficult enough without having to worry about strange graphics characters, charts or tables. That's why we decided to make it easy to enter listings from *RUN* by translating everything we thought might be confusing in any program.

When you see something between the curly brackets, all you have to do is press the keys indicated. For example:

{SHIFT L}—means hold down the shift key and press the L key at the same time.

{COMD J}—means hold down the Commodore key (it is on the lower left side of the keyboard) and press the J key at the same time.

{SHIFT CLR}—hold down the shift key and press the CLR/HOME key.

{HOME}—press the CLR/HOME key without shifting.

{CTRL 6}—hold down the control key and press the 6 key.

{FUNCT 2}—function 2 (in this case, you hold down the shift key and press the function 1 key).

{CRSR UP} {CRSR DN} {CRSR LF} {CRSR RT}—these are the four cursor directions.

{UP ARROW}—means the arrow key (the one with the pi sign under it).

{LB.}—the British pound sign (£).

{PI}—the pi sign key (π); (shift and press the up arrow key).

In some instances, when a large number of characters or spaces are repeated in a listing, we will represent them this way: {22 spaces} or {17 CRSR LFs}.

Print vs Print#

RUN readers should be aware of difficulties that may arise when entering listings that contain the PRINT and PRINT# commands.

These two commands may look very similar, but they are different. If, for example, you use a question mark (?) to abbreviate PRINT in a line such as 10 PRINT#4,A$, then you are signaling to the Commodore computer that you are trying to print the variable #4, which is not a legal variable name.

The command PRINT#4 actually means "print to device number 4." You can abbreviate PRINT# by hitting the P key and the shift and R keys at the same time and then entering the device number. But *do not* abbreviate PRINT# with a question mark.

If you think of PRINT as one command and PRINT# as an entirely different command, then you should have no problems.

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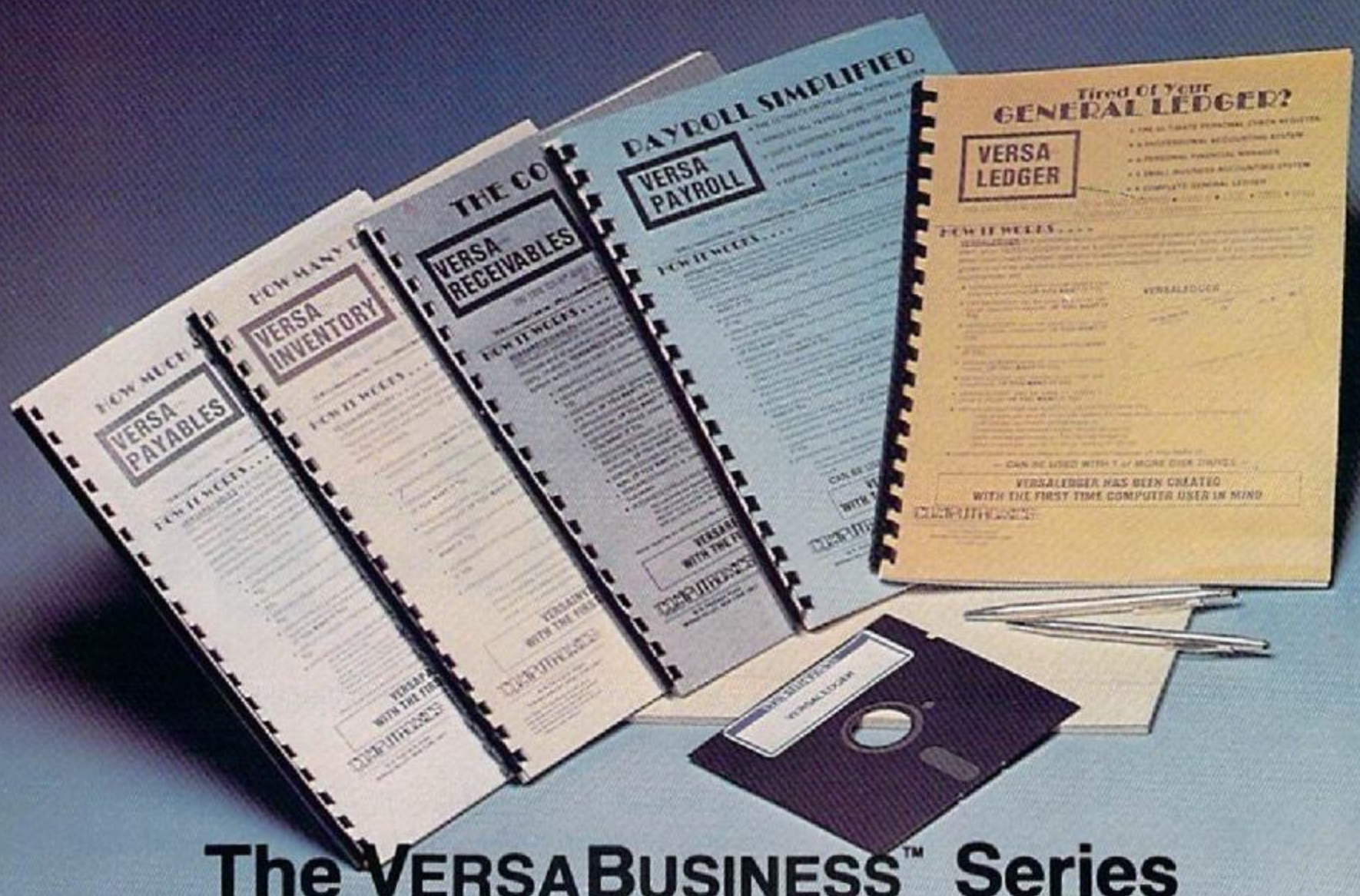

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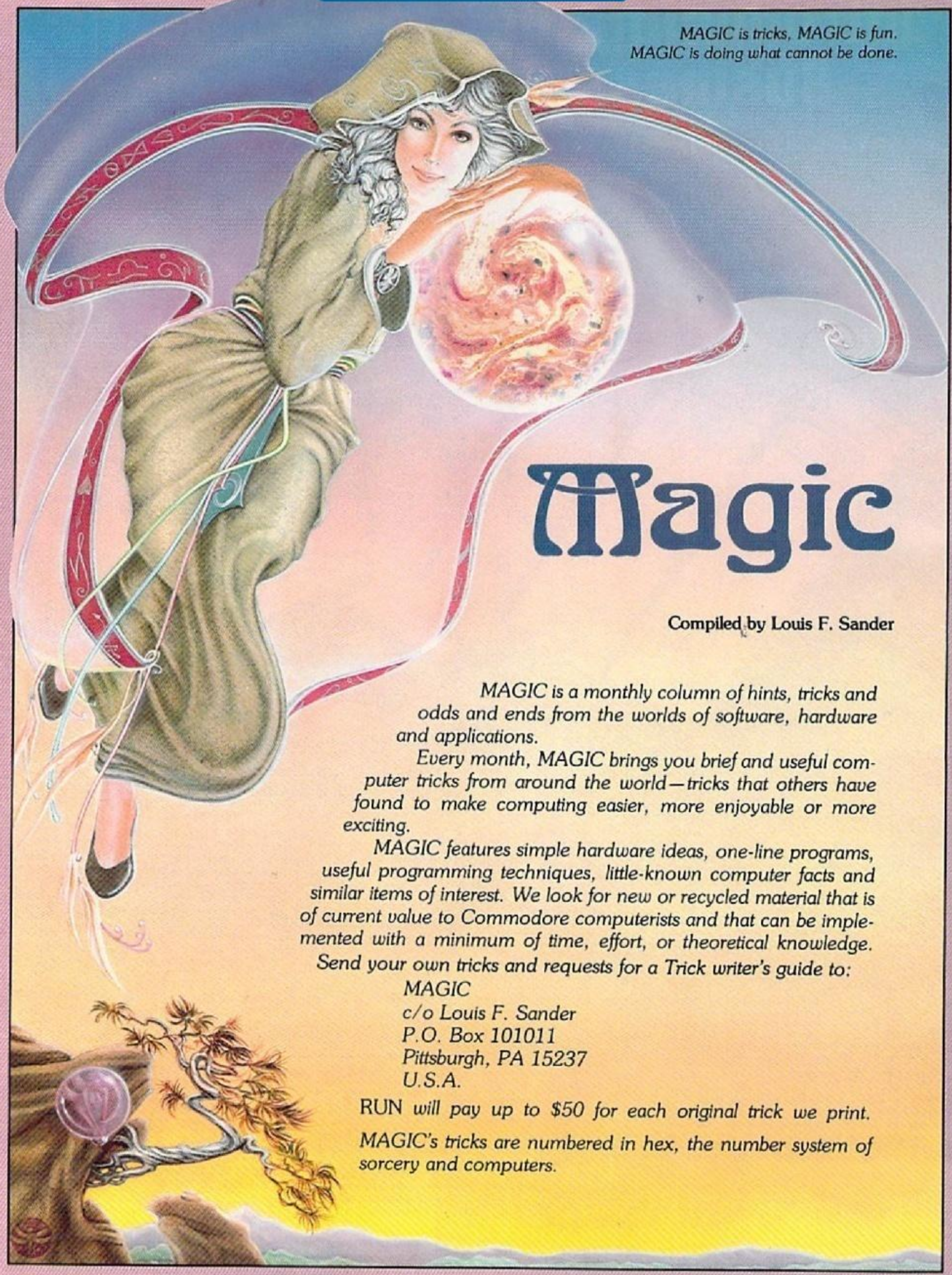

MAGIC is tricks, MAGIC is fun.
MAGIC is doing what cannot be done.

Magic

Compiled by Louis F. Sander

MAGIC is a monthly column of hints, tricks and odds and ends from the worlds of software, hardware and applications.

Every month, MAGIC brings you brief and useful computer tricks from around the world—tricks that others have found to make computing easier, more enjoyable or more exciting.

MAGIC features simple hardware ideas, one-line programs, useful programming techniques, little-known computer facts and similar items of interest. We look for new or recycled material that is of current value to Commodore computerists and that can be implemented with a minimum of time, effort, or theoretical knowledge.

Send your own tricks and requests for a Trick writer's guide to:

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RUN *will pay up to $50 for each original trick we print.*

MAGIC's tricks are numbered in hex, the number system of sorcery and computers.

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From their glade in the forest underworld, Magic's woodland sprites keep a weather eye on the happenings outside. They know that mid-August, when this month's *RUN* is mailed, brings the hottest temperatures of the year for most of our readers—it's a time when disk drives fail, magnetic media melt and everyone wishes for a breath of cooler air.

Well, fellow sorcerers, this *is* Magic, and we're going to *do* something about the heat. September's tricks are a blend of cool moves and icy logic from the frozen lands of the North, with a dash of chilling chicanery from places where summer is winter and autumn is spring.

Our tricks can't cool your computer room, but they *can* sweep you away to worlds where it isn't so warm. So get out your sweaters, and get ready to hit the keyboard.

$D0 Typing tip—A fast way to Poke a zero in Direct mode is by typing POKExxxx, then rolling your finger off the comma key onto the period, then pressing the return key.

The computer interprets the period as a zero, and you've saved a few thousand microseconds of finger fumbling.

Robert A. Adler
Montreal, Quebec
Canada

$D1 Typing tip from Down Under—Hunt-and-peck typists like myself have a problem when typing in programs. With only two eyes, we have to look three places at once—the printed source, the keyboard and the screen.

I dictate my programs into a tape recorder, then play them back with the aid of headphones and a stenographer's pedal-pause switch. Now I load while only having to look at two locations. An added advantage is that I can check for bugs while reading the listing on the screen and listening to the audio tape. The saving in both time and errors is amazing.

John Bath
Darlington, Western Australia
Australia

$D2 Screen sorcery—On the C-64 only, a single screen line can be erased by entering:

```
POKE781,LN : SYS59903
```

(where LN is the line number you wish to erase, from 0–24). You can put this code in a subroutine and use a For...Next loop to clear any group of lines you wish.

Miraculously, it's also easy to copy one line of the screen into another line. If MF is the number of the screen line your text is to be moved from, and MT is the number it's to be moved to, you can move it with:

```
POKE781,MT:SYS59888:POKE172,PEEK(60656+MF):POKE780,
PEEK(216+MF):SYS59848
```

And finally, to scroll the screen up one line, simply use SYS59626.

Barry G. Adams
Fredericton, New Brunswick
Canada

$D3 Cursor magic—To find where the cursor lives at any time, use the following subroutine.

```
20 POKE 783,PEEK(783) OR1:SYS65520:R=PEEK(781):C=PEEK
   (782):RETURN
```

R is the row and C is the column of the cursor's present location, with the first position of each being numbered 0.

You can similarly position the cursor to any row or column by entering:

```
30 POKE781,R:POKE782,C:POKE783,PEEK(783)AND254:SYS 65520:
   RETURN
```

Just set R and C, then GOSUB30.

B.G.A.

$D4 VIC tone generator—Here's a little machine language program that beeps every time a key is pressed. It's written to run in the cassette buffer, so it shouldn't interfere with your Basic program at all. Once the program is Poked into memory, SYS828 will start it, and pressing the stop and restore keys will disable it.

```
60000 FOR A=828 TO 861 : READ B : POKE A,B : NEXT
60010 DATA 169, 15, 141, 14, 144, 120, 169, 78, 141, 20
60020 DATA 3, 169, 3, 141, 21, 3, 88, 96, 165, 197
60030 DATA 201, 128, 240, 7, 101, 197, 105, 128, 141, 12
60040 DATA 144, 76, 191, 234
```

Trevor J. Crawford
Hanover, Ontario
Canada

**$D5 Undocumented characters**—There are four graphics characters that slipped through the cracks in Commodore's documentation. They aren't inscribed on the keyboard, nor are they listed on the CHR$ charts in the manuals, but they *do* appear on some of the screen Poke charts.

They can be accessed only when in Upper/Lowercase mode (which you can get by pressing the Commodore and shift keys simultaneously). Besides being able to type the appropriate key, you can Poke their value or print a CHR$ code. Here they are.

Name	Keys	Poke	CHR$ Value
Checkerboard	Shift Pi	94	126 or 222
Herringbone 1	Comd *	95	127 or 223
Herringbone 2	Shift Lb.	105	169 or 233
Check mark	Shift @	122	186 or 250

Strictly Commodore
Calgary, Alberta
Canada

$D6 Logarithmic operations—Basic's LOG and EXP functions work with so-called natural logarithms, which use the number constant *e* (2.71828) as a base. But most of us are more accustomed to common logarithms, those based on the number 10. You can easily define a function that will calculate logs to the base 10 with:

```
DEF FNL(X)=LOG(X)/LOG(10)
```

To use the function, execute the DEF statement early in your program. After that, any statement like

```
variable=FNL(expression)
```

will set "variable" equal to the common logarithm of whatever number "expression" equates to. Calculating

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FNL(1000) will return a value of 3, which any good math student knows is the common log of 1000.

EXP, LOG's sister function, calculates the value of *e* raised to the power within the parentheses. To define a similar function for 10 raised to the given power, use:

```
DEF FNE(X)=EXP(X*LOG(10))
```

If you try it, you'll find that FNE(3) = 1000, which of course is 10 raised to the third power.

Pascha Shum
Saskatoon, Saskatchewan
Canada

$D7 Colored scrolling stars—You can easily add color to the nice display in Trick $21 (*RUN*, March 1984) by entering the following line.

```
1 N=(RND(1)*16)+1:B$=MID$(" -see text-",N,1):PRINTSPC(N)B$
  "*";:GOTO1
```

To get the material inside the B$ quotes, hold down the CTRL key, then press each key from 1–8; release CTRL, press the Commodore key, then again press each key from 1–8. VIC owners should change the 16 to an 8, and should type only the CTRL characters inside the quotes.

Claire Farrell
Dartmouth, Nova Scotia
Canada

$D8 Modulo math—If you do mathematical work, the modulo function may prove useful. It gives the remainder in a division operation. Using the DEF FN statement will make the modulo function available at any point in your program.

```
100 INPUT "ENTER DIVIDEND";A
110 INPUT "ENTER DIVISOR ";B
120 DEF FNMOD(D)=INT((A/B-INT(A/B))*B+.5)
130 PRINT A" MODULO "B" = "FNMOD(D)
```

Peter L. Vogel
Port Coquitlam, British Columbia
Canada

$D9 Preserving variables—When using the Run command in Basic, all variables are set to 0. If you want to start a program without clearing any variables, you can use the GOTO command in Immediate mode (e.g., GOTO 100). This trick works on any Commodore computer.

Andrew King
Burnie, Tasmania
Australia

$DA Loading machine language—When you want to load some machine language while a Basic program is in memory, you're faced with a dilemma. Since loading the ML disrupts some internal pointers, you have to use the New command, which removes your Basic from memory, after the program has loaded.

You can avoid the problem by temporarily adding the following two lines to your Basic program.

```
0 END
1 LOAD "programname",8,1
```

Programname, of course, is the name of the ML program you want to load. To load it, just enter RUN 1. Since your program is now being loaded from Program mode, there's no need to use the New command. (Program mode loads don't disrupt the pointers.) Line 0 will prevent your Basic program from being executed again after it's loaded.

If you want to load ML from a Basic program and have the Basic continue after the ML loads, use:

```
0 IF F=0 THEN F=1 : LOAD "programname",8,1
```

The first time you run the program, F has the value 0 and the file will be loaded. Once it's loaded, the program will start running all over again, but with the values of all variables intact. Since F = 1 at this point, line 0 will be skipped and the rest of the program will run as usual.

Barry G. Adams
Fredericton, New Brunswick
Canada

$DB Loading from Program mode—When one Commodore program loads another, the second must be shorter than the first, or great confusion ensues. (The purpose of this restriction is to allow the second program to use variables that have been set up by the first one.)

If you're loading from tape, you can get around the restriction by entering:

```
600 POKE631,131:POKE198,1:END
```

This has the same effect as pressing the shifted run/stop key.

Geoff Shukin
Saskatoon, Saskatchewan
Canada

$DC Tape load timesaver—As many of us know, programs are recorded twice on each cassette, following a 15-second header. The dual recording scheme is used for error correction, but if there are no errors, the whole program is in memory as soon as the first copy of the program has been read.

You can use this fact to your advantage in shortening the time it takes to load a program. To cut loading time almost in half, use the following line before you use any variables in your program.

```
10 POKE 45,PEEK(831) : POKE 46,PEEK(832) : CLR
```

Now when you are loading the program, press the computer's stop key any time after the header and the first program copy have loaded, then run the program normally. Line 10 will compensate for your failure to load the second copy. The proper stopping point is just over half way between the Found and Ready prompts. You can use the tape counter to find this point once for each program; then write it on the cassette for future reference.

Derek Richards
Papakura, New Zealand

$DD Cassette error hint—If you experience numerous errors when saving, verifying or loading with the Datassette, a possible cause might be conflict with the C-64 DOS wedge program.

If you're using that program with a disk drive, enter @Q before using the Datassette. This command turns off the wedge program and may clear up your errors. To re-ener-

(continued on p. 120)

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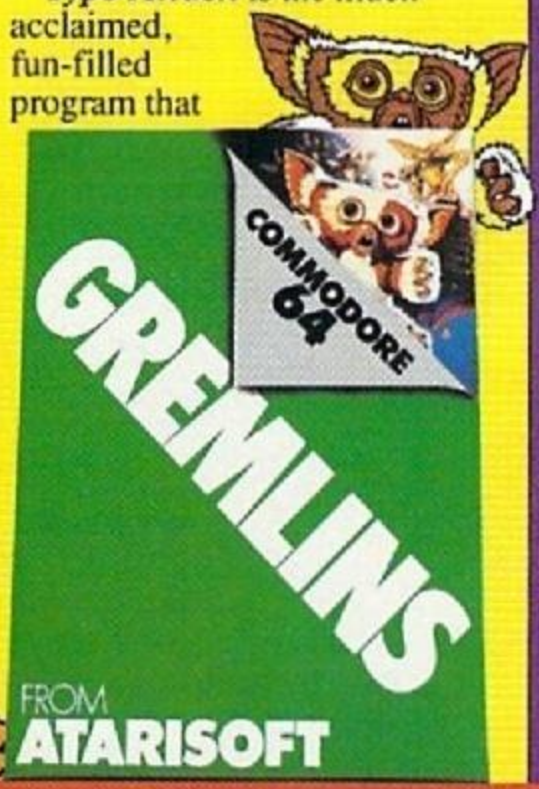
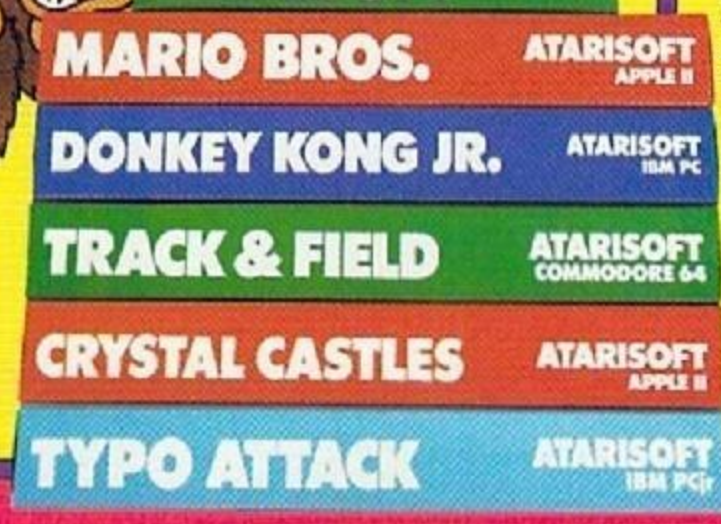
In *Donkey Kong Jr.*[2] by Nintendo[2] Junior tries to rescue his father against immense odds. And speaking of Donkey Kong, there's also *Mario Brothers*[2] by Nintendo[2]. This time, Mario and his brother Luigi battle creatures on four levels of floors, encountering all sorts of treacherous enemies.

In *Track And Field*[3] you can compete by yourself or head-to-head with another player. But each player must beat qualifying times, heights and distances before they can compete in each of the gruelling six events.

Typo Attack is the much-acclaimed, fun-filled program that allows you to enjoy developing your typing skills at any level.





And still playing to the delight of audiences everywhere are *Pac-Man*[4]; *Ms. Pac-Man*[4]; *Jungle Hunt*[5]; *Battlezone*™[6]; *Donkey Kong*[2] by Nintendo[2]; *Centipede*™[7] and *Pole Position*[8].

So, if you've been searching for ways to entertain your Commodore, Apple or IBM, treat it to one of the best shows in town, one of the hits from ATARISOFT.

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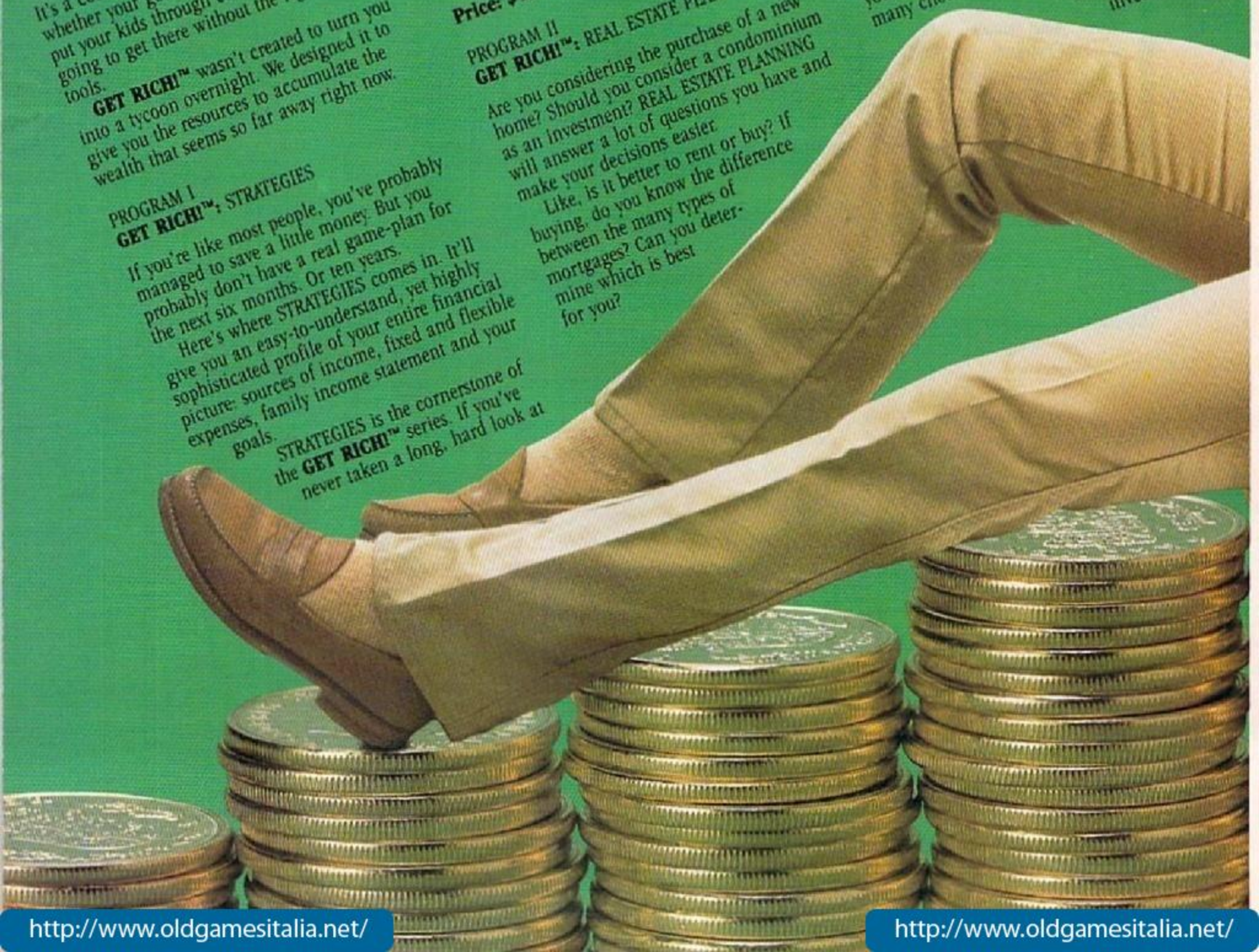

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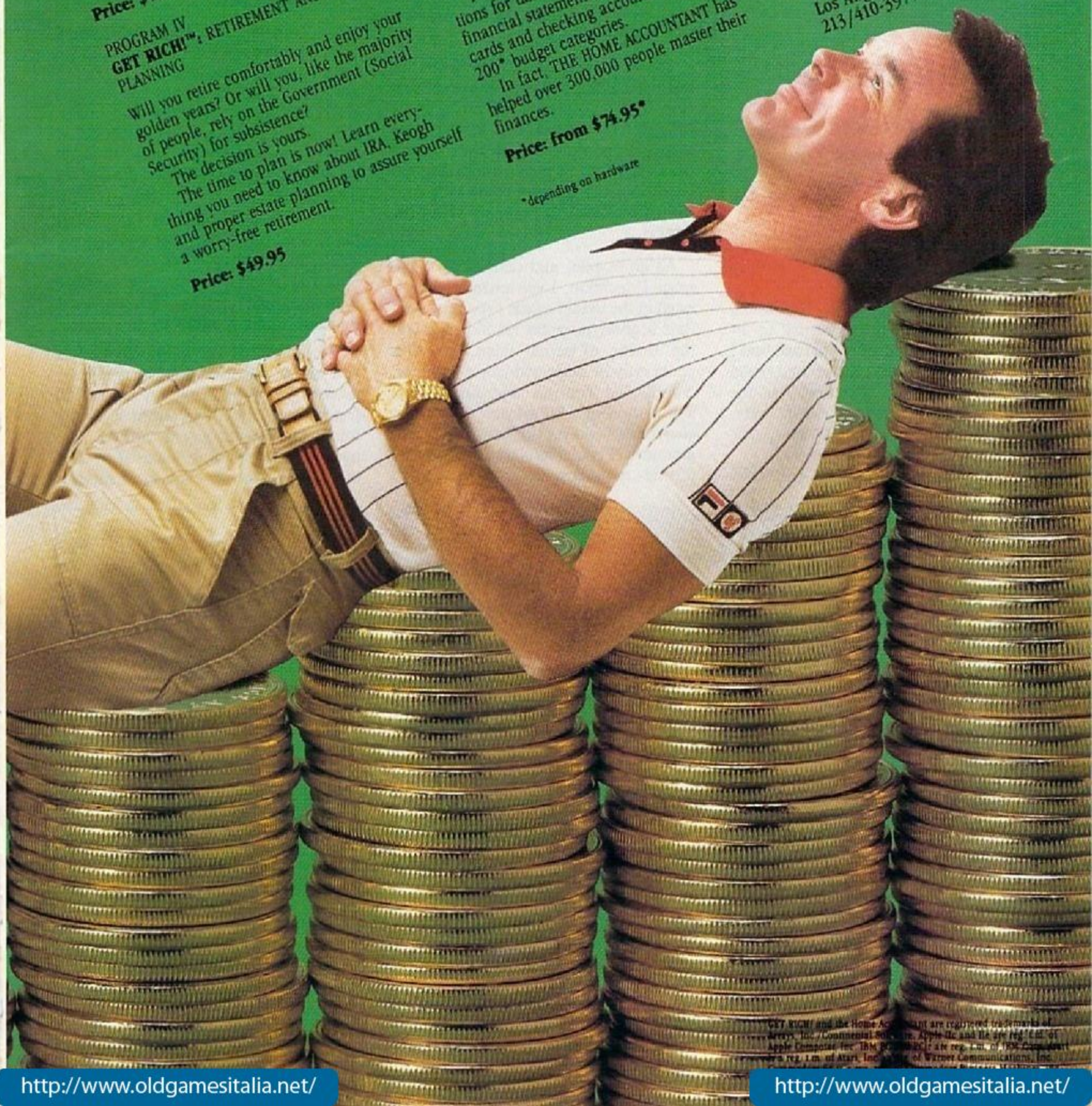

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Flight Simulator II

If You've Never Been To Flight School, Here's Your Chance to Get Airborne

I stood around the store for hours, waiting for the delivery truck to arrive. On it was a software package that I (and thousands of others) had been waiting months to see. This was the same program that had astonished everyone on the IBM PC. I didn't want to miss it, even if it turned out to be a dud.

That package was the new release by SubLogic Corporation, Flight Simulator II for the Commodore 64. The wait was well worth it.

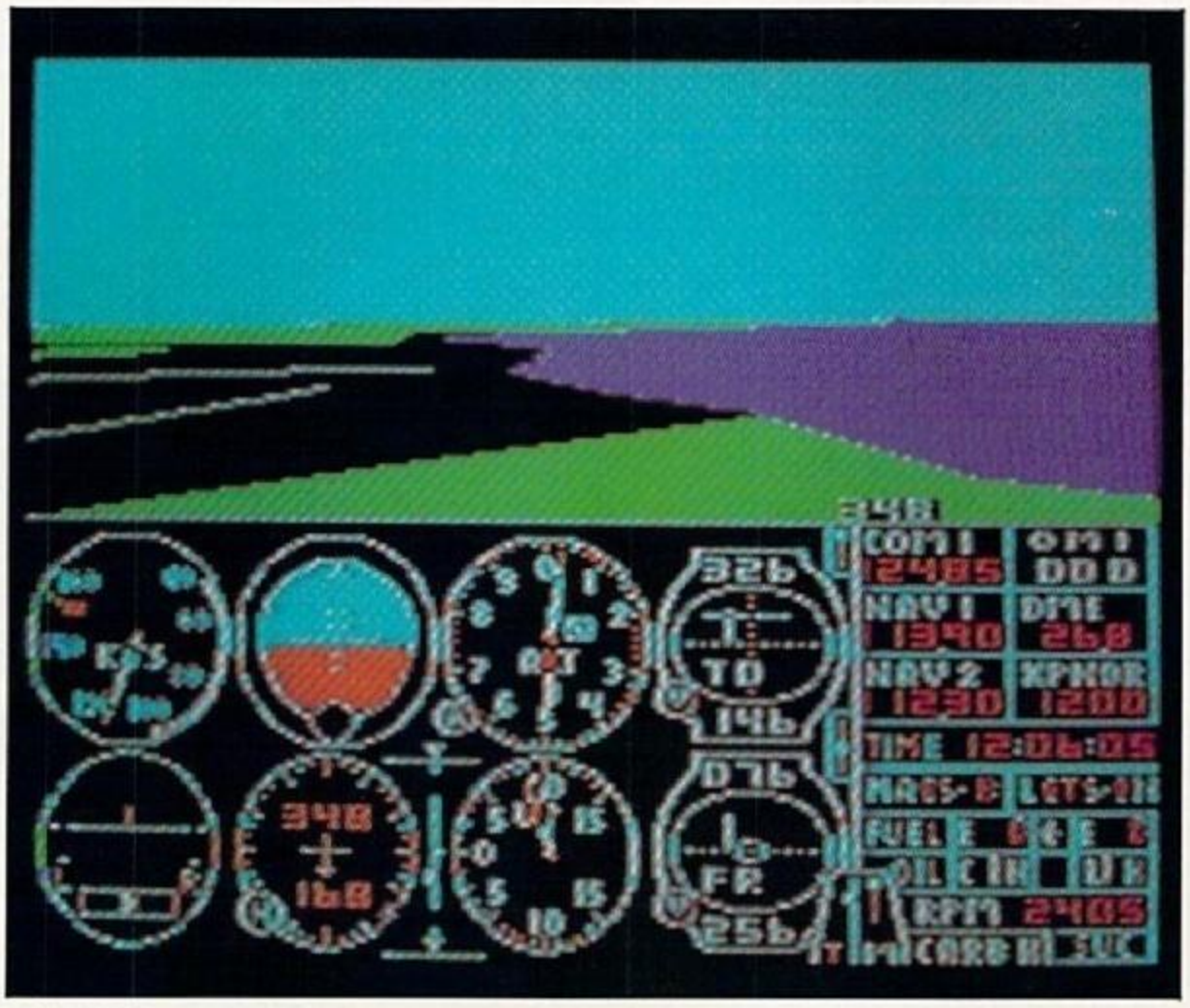
The Commodore 64 conversion of this outstanding program is a great success. It is as detailed and colorful as the original IBM version. But, most importantly, all the features and controls have been retained. Nothing important has been left out. At last, I could take control of the best flight simulator on the market.

As an ex-pilot and teacher of Aerospace Education, I was extremely interested in the details of the program. I felt that a good program should give you the feeling of actual flight, and this could only be done with good graphics, coordinated controls and instruments and a thorough knowledge of the mechanics of flight on the part of the programmer. Flight Simulator II meets all of these requirements.

The Visual Display

On start-up, the three-dimensional view from your aircraft's window is the most impressive first encounter with the program. The simulation opens with your plane on the ground at Meigs field, a small airport fifteen miles southeast of O'Hare International. The runway, landmarks and landscape appear as they actually exist outside Chicago. This is only one of 80 airports throughout the U.S.A. from which you can choose. The graphics perspectives are excellent. Even the beacon tower on the shoreline is in the right location. It's apparent that this program means to do it right!

The sound of the idling engine lets you know that everything is ready for takeoff. Since the manual is almost 100 pages long, I rapidly scanned it until I found out how to give it throttle. The nose jerked upward as I started to take off. I knew that my chances of survival



Report Card

A **Superb!**
An exceptional program that outshines all others.

B **Very Good.**
One of the better programs available in its category. A worthy addition to your software library.

C **Good.**
Lives up to its billing. No hassles, headaches or disappointments here.

D **Mediocre.**
There are some problems with this program. There are better on the market.

E **Poor.**
Substandard, with many problems. Should be deep-sixed!

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GET STARTED ON THE RIGHT FOOT

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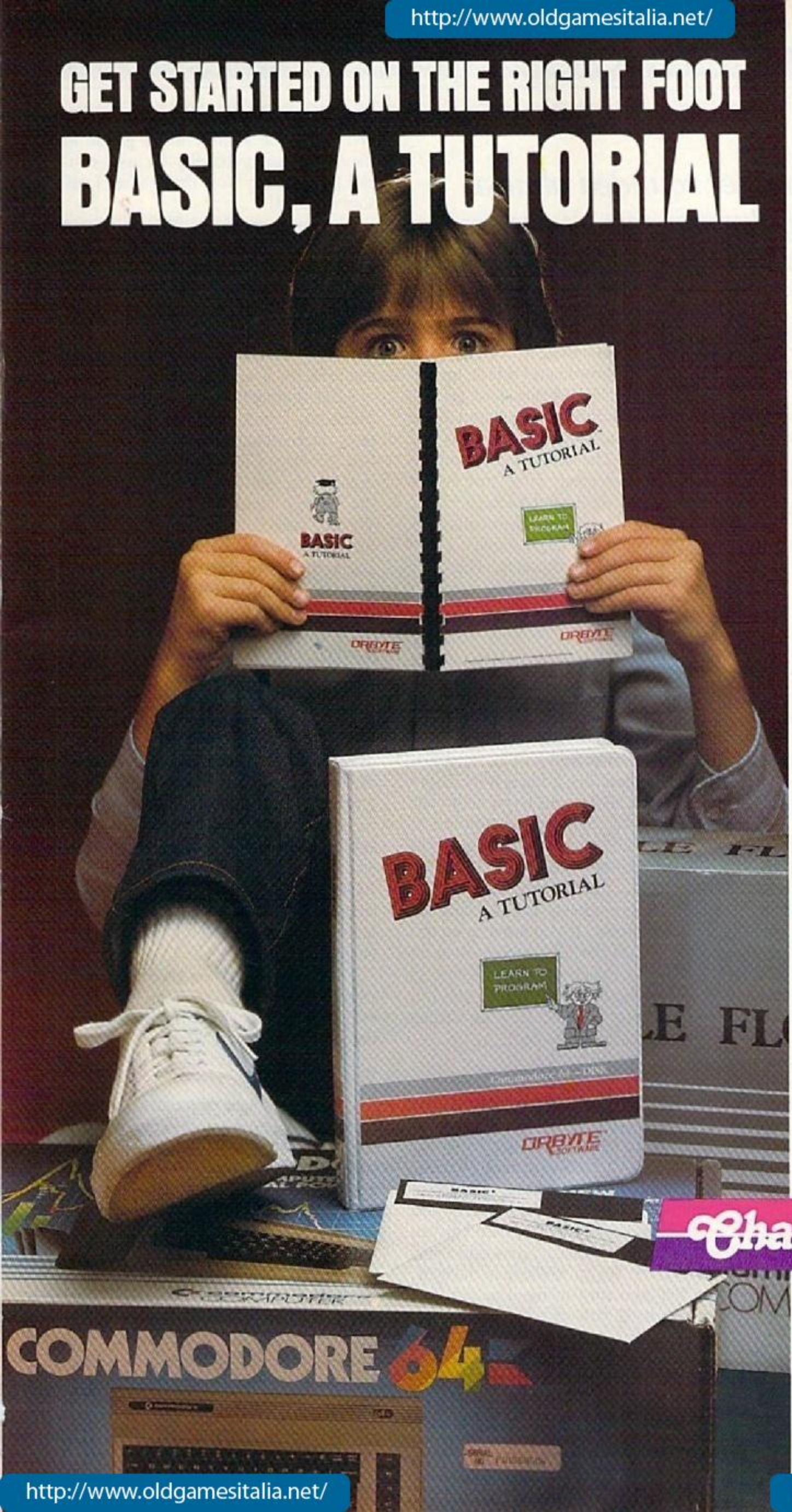

BASIC, A TUTORIAL is a great way to get started on your Commodore 64. It helps you to better understand your Commodore so that you can use it with ease and effectiveness.

BASIC, A TUTORIAL is a MUST for both recent Commodore purchasers and dedicated Commodore owners. It is a program that not only teaches you about the functions of the 64, but also how to use them to design your own programs.

Complete with two disks and a comprehensive lesson-by-lesson text manual, BASIC, A TUTORIAL takes you from turning on the machine, through lessons on all the B.A.S.I.C. keywords and commands, to finally completing your own telephone/name and address database.

Here are some of the topics you will cover through actual hands-on experience: the Commodore 64 keyboard; B.A.S.I.C. keywords, punctuation, and program modes; on-screen editing and printing; mathematical operations; subroutines; string handling; system utilities; disk files; and using a printer.

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The stall-warning buzzer sounded almost immediately. This baby was out of control, and I couldn't stop it.

were slim, but I had always wanted to fly without having to go through ground school. Believe me, I should have read the manual!

The stall warning buzzer sounded almost immediately. The horizon went out of kilter as I frantically yanked on the control stick. This baby was out of control and I couldn't stop it. Little did I know that I had only given it half throttle. I had a lot to learn, but first, I had to swim out of Lake Michigan.

The Instrument Panel

Most of the excellent instruction manual is devoted to explaining the instruments and how to use them. Since there are 27 instruments in five different clusters, this is a complicated affair. If you've never had ground school, you are about to start. The control panel is that of a Piper Cherokee Archer II, which is a sophisticated single-engine aircraft.

In addition to the six major control indicators, such as the artificial horizon, altimeter, rate-of-climb indicator and airspeed indicator, there is also a complete radio stack that includes two navigational radios, two Omni indicators and a communications set. Three more sets round out the navigation cluster: the transponder, the Automatic Direction Finder and the Distance Measuring set (DME). Each can be separately tuned to the desired frequencies. These frequencies are clearly marked on four navigational charts provided in the package. When Air Traffic Information is tuned, the weather, ceiling, runway headings and other instructions are printed briefly on the screen. This is done for the control tower frequencies also. (They might even request that you turn on your lights or hit the transponder.)

There are indicators of various types all over the console. These range all the way from the flaps-setting indicator to the throttle-mixture setting needle. Just learning where all the indicators are located consumes a major portion of the first session.

Okay, now that I knew a little more, I felt that I could handle it from here on. I gave it full throttle and a little up elevator—this time I managed to get airborne with no trouble. The sound of the engine told me that the climb was just about right. The artificial horizon indicator looked great. Now just a little left stick and we'll head back to Meigs. A peek out the back window (using the number five and B keys) showed Meigs sliding away in the distance. There are eight other views including straight down.

The Radar

The radar system is activated by hitting the number four key. The small outline of the aircraft is shown flying over the terrain. The small airports and roads are shown below. This is similar to using a map, but it has a nifty Zoom feature that allows you to view the terrain from either high or low altitude. If you see a road below, you can change to a higher altitude perspective, and the entire region will become visible. This handy feature allows you to easily locate your airport. If you are over an airport at 10,000 feet, you can zoom in on the runways and even read the numbers on the tarmac. If you are on the ground, you can use it effectively in taxiing maneuvers around the field.

The Editor

The editor allows you to determine your own flying situation. A menu of some twenty items allows you to set the time of day, the seasons, and even the cloud configuration. Setting the time to twenty-three hundred hours gives you night flight, where all that you can see are the airport runway lights and lights of the cities. If you're flying in daylight, day will even turn to night as the time progresses, if you stay at the controls long enough.

You can also program your geographic location. Choices include the Los Angeles area, with the small Catalina field in the distance. You can even program the wind shear. Best of all, you can make the aircraft more gentle to handle by programming an over-control limit factor. Now that's what I call sophisticated!

The main mode is Regular (easy) flight, but the Realistic mode makes things truly difficult. In this mode, you have to do everything yourself, such as turning on the engine, setting the mixture control, switching gas tanks. . .you name it! Some functions on the plane can even fail in this mode.

After finding that I could set the coordinates, I started flying out of Kennedy International. The Big Apple is the best because of the many familiar landmarks. The statue of Liberty stands in the harbor; the twin towers of the World Trade Center, Central Park and the Empire State Building are all here, adding to the realism. (I couldn't resist the temptation to zoom in on the Statue of Liberty. I had to swim out of New York Harbor, but not before I got a good close-up look at Miss Liberty.)

Landing

My biggest problem turned out to be landing the plane. For some reason, I just couldn't glide in properly. Most of my time was spent taking off and flying around to the other end of the runway for another try. I discovered that if you enter the coordinates five miles from the end of the runway, set your altitude to 3000 feet, head toward the numbers on the runway and set your throttle at one half, you can create your own practice landing mode.

Then I discovered the glide slope indicator on the Omni dial. With this, your rate of descent can be adjusted to match that of the individual runway.

World War I Ace

I consider Flight Simulator II to be the ultimate home computer game. Just learning to master the controls and instruments is challenge enough. However, if you ever do become an expert, SubLogic has included an aerial battle game on the same disk, which will put your skills to the test.

With World War I Ace, you fly in a small area separated by a river. Your bases and fuel tanks are on one side of the river, and the enemy's are on the other. Your airstrip even has a 3-D hanger into which you can taxi your plane. You are armed with a machine gun and bombs. Of course, the object

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The bombs whistle as they drop, and the explosions are quite realistic. The targets are not easy to hit.

of the game is to shoot down the enemy planes and blow up their facilities before they do the same to you. Even though it is World War I, your plane is equipped with radar. This time, it's located on the instrument panel. It shows you if there are enemy planes within your range. You also have the Zoom feature for better navigation to the bomb drop areas. You will not do too well against the enemy fighters unless you can handle your own airplane well.

You must press the X key to drop bombs. The bombs whistle as they drop, and the explosions are quite realistic. The targets on the ground are not easy to hit. Besides trying to keep your plane under control, you are trying to avoid the enemy fighters and bomb their depots at the same time. To add to the confusion, the area is bordered closely on two sides by high mountains, which you must carefully avoid. The inexperienced pilot doesn't last long!

Another Challenge

Another test of skill on the Flight Simulator disk involves flying cross-country under complete IFR conditions, using only your instruments and an occasional message from an air traffic controller. This takes every bit of concentration and confidence you can muster. You have no landmarks, no horizon or radar. You must turn your navigation radios to each of the frequencies on the charts as you fly. To make matters worse, there is no autopilot. So you must read the charts, set the equipment and fly the plane at the same time.

Final Comments

At $49.95, Flight Simulator II is a real bargain. I have not experienced another flight simulator that takes so many factors into account so accurately. The beginner who wants to learn about flying and the mechanics of flight should definitely have a copy—the learning value alone is well worth the purchase. The old pro will find it challenging, too. Video game fanatics who have "beaten them all" should try this one! *(SubLogic Corp., 713 Edgebrook Drive, Champaign, IL 61820. $49.95.)*

Jim Stephens
Nashville, TN

Super-Text

Here's a Super Word Processing Package for The Serious User

To be truly useful, a word processing package must contain numerous features that can be easily accessed through a simple, straightforward command structure. If properly organized and implemented, such a command routine quickly becomes second nature to the user, thereby reducing learning time, frustration and time spent completing tasks.

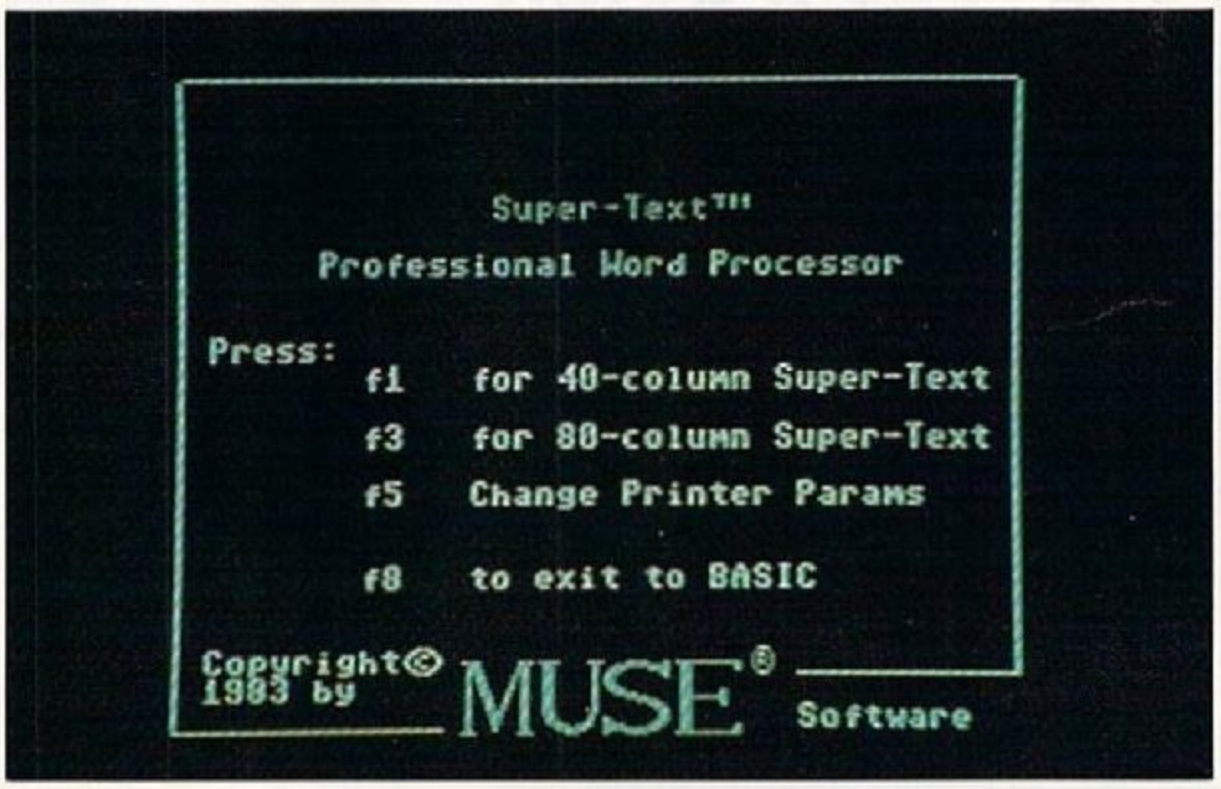
Muse's Super-Text Professional Word Processor for the Commodore 64 is such a package. It contains two program disks, an excellent wire-bound manual and a separate quick-reference foldout.

Users are taken every step of the way with clear-cut, concise instructions. The on-screen menus are faithfully reproduced in the manual, so there is never a question as to what a certain screen looks like if the program isn't booted.

One of the prime advantages of Super-Text over most other C-64 word processors is that it can generate a legible 80-column screen without additional hardware. While using this option, screen layout can be made to appear exactly as it will be printed, eliminating the need to view output to video before obtaining your hardcopy. This is an incredible time saver!

For those using a low-resolution monitor or a TV set, there is a normal 40-column display, which is automatically entered upon loading. (By the way, the Commodore 1702 monitor does a nice job of displaying the 80 columns.)

The introductory chapter of the manual provides a nice tutorial on how to load the program, create, save, delete and load files. It also touches upon the help screen available in the 80-column mode and lists a key summary. The next two chapters complete the information on file handling by covering previously



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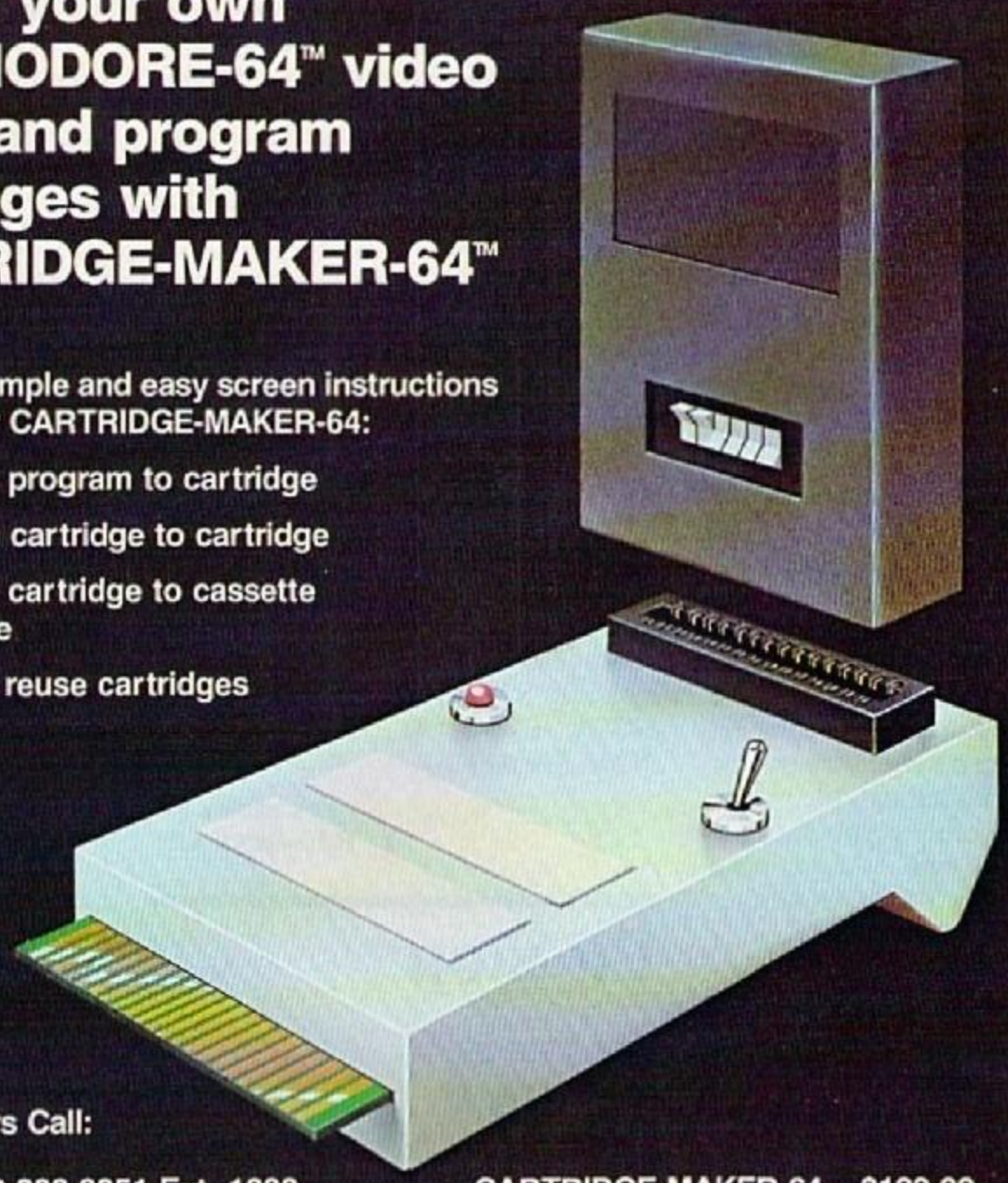

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Unlike some other C-64 word processors, Super-Text quickly accesses the disk.

mentioned items in greater detail. File merge, use of the on-screen status line and initializing blank disks are also explained.

The file-editing commands and modes are very thoroughly discussed. Find and replace (word or phrase), cursor control, text scrolling and the Add and Change writing modes are covered. Use of block operations for text insertion, deletion or copying are also discussed. Making use of the split-screen capabilities are highlighted, as well as special feature options such as estimating total number of words, determining the number of occurrences of a specific phrase or word and identifying the last three changes made to the text.

Methods of format control are explained in two chapters. The first shows how commands can be sent for each line of text (showing on-screen, but not on the printout). The other illustrates how to change the layout settings, the printer specifications, color combinations, background, text and other control functions by altering the default settings for each.

This system also works for autolinking separate documents, setting the type of paper used, entering control key sequences and accessing any special printer capabilities, such as underlining and boldfacing. Super-Text can handle whatever the hardware can do—it has numerous pre-set default options, any one of which can be altered to custom fit a printer not normally linked to a Commodore 64.

The flexibility of this program, coupled with its breadth of features and ease of use, make it an outstanding package. In under 90 minutes, I was able to put the program through its paces and then use it with a good deal of confidence.

Besides the expected features, Super-Text also lets you effortlessly recover any lost files due to an accidental reset, save document blocks as different files and perform a line ditto with just two keystrokes.

You can input most of the commands with just two entries, though a few require three. The extra stroke, due to the abundance of features offered, isn't really detrimental in controlling the program. Almost every command can be entered in two different ways, because the function, control and Commodore keys are utilized solo or in unison with others. This choice of input allows you to use whatever format you feel the most comfortable with.

Unlike some other word processors for the C-64, Super-Text quickly accesses the disk. There are no long waiting periods while the computer hunts down the desired data. (The most sophisticated program isn't worth much if its speed isn't up to snuff!)

If you are looking for a word processor, or are dissatisfied with the one you already own, then by all means, look into Super-Text! *(Muse Software, 347 N. Charles St., Baltimore, MD 21201. $99.00.)*

Ted Salamone
Bridgeport, CT

Pit Stop

Test Your Skill On the Track And in the Pits!

B

Until now, all racing games were basically the same. No matter how fantastic the graphics, it came down to a contest of speed and driving skill. Epyx has brought the realism of computer racing games one step further. Pit Stop is the first driving contest that requires you to take the roles of both driver and pit crew.

Here's how the game works. First, you can select the number of players (up to four can compete, though not simultaneously), difficulty level and the number of laps. You can also choose to compete in a single race, a mini-circuit of three races or a grand circuit of six races.

If you choose a single race, you will be given a choice of six tracks: Monaco, Le Mans, Albi, St. Jovite, Jarama and Kyalami. For a mini-circuit, the computer will randomly select three of the six courses; on the grand circuit, you will have to conquer all six.

Your joystick-controlled racer appears on the track near the center of the screen. A radar map to the left of the track shows an outline of the entire course with a blip representing your car. At the bottom of the screen is an instrument panel, showing which lap you're on, the total elapsed time, your speed and the amount of fuel you have left.

Throughout the race, you'll have to keep an eye on your fuel supply and the condition of your tires. You begin the race with dark blue tires, but with each collision, they suffer a little damage. After becoming light blue and then green, they will finally turn red. In this condition, any collisions may put an abrupt end to your race. To replace worn tires or just refuel, you'll have to pull into the pits.

Each time you complete a lap, the right lane will widen just beyond the start/finish line. To enter the pits, simply steer your car into this right lane. Be quick, though. If you miss it, you'll have to complete another whole lap before you get another chance.

In the pit area, you command your crew of three by moving a blinking cursor onto each member in turn, and then moving him around to perform his function. If you're low on fuel, begin filling it by moving the man with the hose to the rear of the car. While the tank is filling, you can change a tire or two by controlling the men to the left and right of the car. Don't forget about the refueling, though. If the tank gets over-filled, it will burst and you'll have to start filling it all over again. When all the necessary repairs have been made and the crew is standing away from the car, move the cursor to the flagman at the bottom of the screen, and press the fire button to get back onto the track.

One of the best things about this racing game is that, when the race is over, the winner not only gets the satisfaction of winning, he gets a cash purse as well. For finishing first in every race of a grand circuit, the skillful driver will earn $300,000, plus an additional $1000 per lap. If you do win big, don't forget to

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take care of your pit crew. After all, you couldn't have done it without them! *(Epyx, Inc., 1043 Kiel Court, Sunnyvale, CA 94089.)*

Bob Guerra
Charlestown, MA

Quintic Warrior was once considered a good game; now, it may be ready for retirement.

Quintic Warrior

Make Your Stand Against Sinister Crabmen and Mangled Mutants

Quintic Warrior is an arcade-type offering for the Commodore 64. "Part man, part Superman, the Quintic Warrior stands alone against the sinister Crabmen and Mangled Mutants in a Dome City of the future.... Are you warrior enough to stand by his side?"

So goes the documentation for Quintic Warrior. But just what kind of value is Quintic Warrior?

In case you're wondering where the name comes from, the documentation also informs us that: "The Quintic Warrior has a fifth sense or attribute consisting of a combination of instinct, cunning and supreme fighting ability. This combination is called the Quintic Factor."

The basic objective of Quintic Warrior is to blast away at Zoronian mutants as they try to reach the top of the screen. Just visualize Space Invaders turned upside down and you'll have a good idea of the concept behind Quintic Warrior. As these mutants travel toward the top, three laser snares (guns) on the right, left and bottom sides of the screen try to zero in on your ship and stop you from killing the mutants.

The score, difficulty level, high-score and number of lives left are shown at the top of the screen. As the game proceeds, another hostile gun called a zed rammer appears and tries to destroy you. A mutant worm also shows up once in a while—a difficult thing to destroy.

The instructions are shown on the screen at the start of the game. There are 21 different levels of Quintic Control (difficulty levels), selected by pulling back on the joystick. All this really does, though, is add more mutants and speed up the game pace. You still only have one type of screen display and no other special effects.

For me, Quintic Warrior became a bit dull after the initial learning period. You can fill the screen with aliens, but the display and game variations are outdated and very limited. The only control device used in the game is the joystick, which is used to control your ship and fire your guns.

Quintic Warrior lacks the qualities that are supposed to be characteristic of a Quintic Warrior. At $24.95 for tape and $29.95 for disk, it's overpriced for what you get.

A couple of years ago, Quintic Warrior would have been considered a good game. But now, it may be ready for retirement. I wouldn't recommend Quintic Warrior as a good buy unless you're new to the Commodore 64, have never played a computer or arcade game and are looking for a simple action game to start your software library. However, the $25 might be better spent on some other game.

The Quintic Warrior himself is ready for retirement. He's already fought off too many Zoronian mutants. *(Quicksilva, Inc., 426 West Nakoma, San Antonio, TX 78216.)*

Larry Bihlmeyer
Pontiac, MI

Eliza

This Therapeutic Program Is Ready to Listen To Your Troubles

Can a computer think? About thirty years ago, a British mathematician named Alan Turing came up with a test for deciding. Seated at your terminal, you type in questions which are then sent to a hidden respondent. If you cannot tell whether the answers are those of a computer or a person, the computer has passed Turing's Test and can be said to think.

While no computer has ever passed Turing's Test, one of the most interesting attempts at artificial intelligence is now available on disk for the Commodore 64—Eliza, from Artificial Intelligence Research Group.

In the mid-1960s, an engineer named Joseph Weizenbaum became interested in question-answering programs. He developed a simulation of a non-directive psychotherapist. The program was called Eliza.

To understand the program, you have to know a bit about theories of psychotherapy. Non-directive therapy is based on the theories of Carl Rogers. He believed a patient could be helped by reflecting the patient's own words back to him. If you say "I don't like my neighbors," a Rogerian therapist might reply "Why don't you like your neighbors?" This puts the patient back in the hot seat and encourages him to keep talking.

A computer that throws your own words back at you creates the illusion that it understands you, even if it doesn't. (But that's also true of human therapists—they may reflect your words back at you without understanding anything about you or your problems!) In fact, all of us do it every day. Someone will tell us something we don't understand, but we still say "yes" and "I see," even if we don't.

The power of the original Eliza can be surmised from incidents that have become part of the history of artificial intelligence. Numerous stories have been circulated about secretaries and scientists who became seduced by Eliza to the point of pouring out their troubles.

Weizenbaum and a psychiatrist with whom he collaborated, Kenneth Colby, had a serious difference of opinion about the uses of Eliza and another similar program called Doctor. Colby felt

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that such programs might ultimately prove useful in doing psychotherapy. Weizenbaum argued that Eliza was only sleight of hand and only human beings could be "real" therapists. Whatever position you take does not affect the conclusion that Eliza is a powerful creation. Originally designed to run on mainframes, it has been adapted by Steve Grumette of the Artificial Intelligence Research Group to run on the C-64.

To give you an idea of how the program performs, I have reproduced below part of a conversation I had with Eliza while preparing this review. Eliza's comments are in capital letters; mine are in lowercase.

"HOW DO YOU DO. PLEASE TELL ME YOUR PROBLEM."
"I have to review you."
"PERHAPS IN YOUR FANTASY WE HAVE TO REVIEW EACH OTHER."
"My editor wants facts, not fantasies."
"YOUR EDITOR WANTS FACTS NOT FANTASIES—THAT'S INTERESTING."
"Does that interest you?"
"WE WERE DISCUSSING YOU—NOT ME."
"What would you like to know about me?"
"WHY DO YOU ASK?"
"Do you really understand me?"
"WHY DO YOU THINK I REALLY UNDERSTAND YOU?"
"I want to be certain."
"WHAT WOULD IT MEAN TO YOU IF YOU GOT TO BE CERTAIN?"
"It would reassure me."
"I AM NOT SURE I UNDERSTAND YOU FULLY."
"I like to be reassured."
"WHY DO YOU NEED TO TELL ME YOU LIKE TO BE REASSURED?"
"It keeps us talking."

Both sides of a conversation are stored in a buffer with a capacity of 50 exchanges. If the conversation goes past that point, earlier exchanges are eliminated to make room for newer ones. The conversation may be recalled to the screen in its entirety or sent to your printer.

Eliza works by focusing on the keywords of your statement to formulate a response. If you avoid a particular topic, Eliza will interject random comments about it. The mechanical nature of the program becomes evident if you keep saying "yes." Eliza has four replies to your use of the word "yes," and she merrily continues to cycle through them repeatedly. Her replies to "yes" are: "You seem quite positive," "I see," "You are sure?" and "I understand."

Although Eliza can't pass Turing's Test, it is a very entertaining program. Eliza is available for $25 in a protected version or $45 for a source version that can be listed, allowing you to modify the program. *(Artificial Intelligence Research Group, 921 N. La Jolla Ave., Los Angeles, CA 90046.)*

Jerome Beck
Glendora, CA

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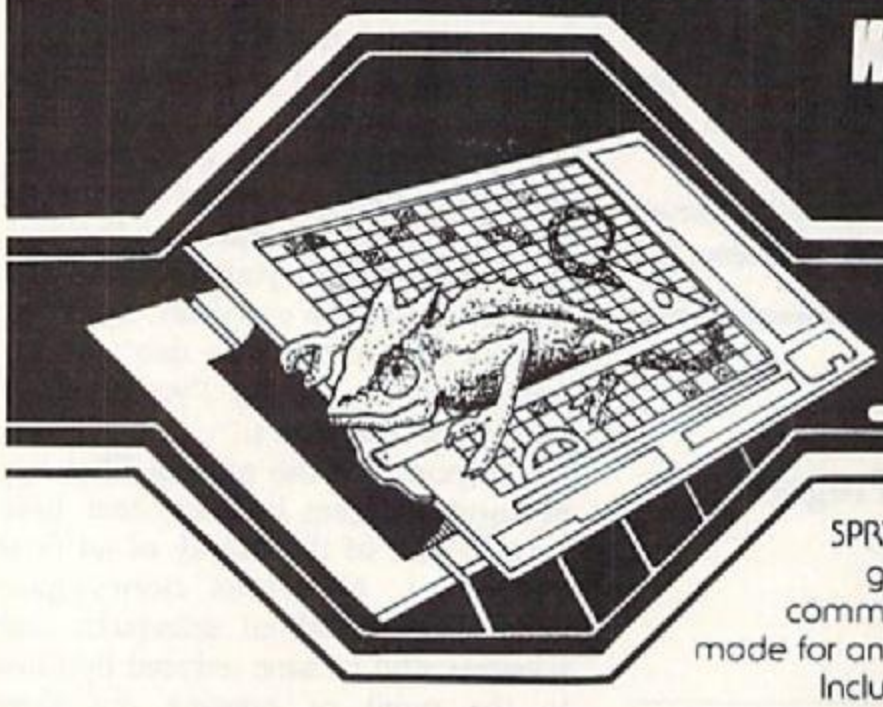

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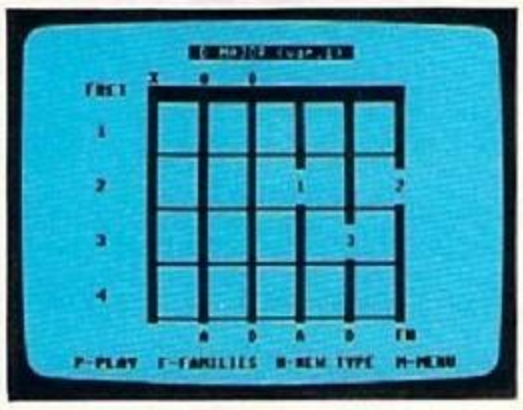

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Video Casino

By David D. Busch

You're the pilot of a small propeller plane, and if you don't let clouds get in your eyes, you'll learn about on-screen animation as you maneuver to stay aloft.

Are you interested in learning, on your C-64 or VIC-20, how professional game programs produce on-screen animation? Sky Pilot is a game that makes interesting use of the built-in Commodore character set to produce images that resemble a single-engine airplane, as seen from above. Depending on which direction the plane is moving, it will point north, south, east or west.

In Sky Pilot, you use a joystick to maneuver a propeller airplane around the screen, avoiding clouds that impede visibility. If the plane strikes even one cloud, the game will end. The object is to fly for as long as possible, to provide a new high score.

New clouds constantly and randomly appear on the screen. The longer you keep the plane aloft, the more difficult it will be to avoid them. Eventually, the entire screen will fill with clouds. But, by that time, you'll have crashed and ended the round.

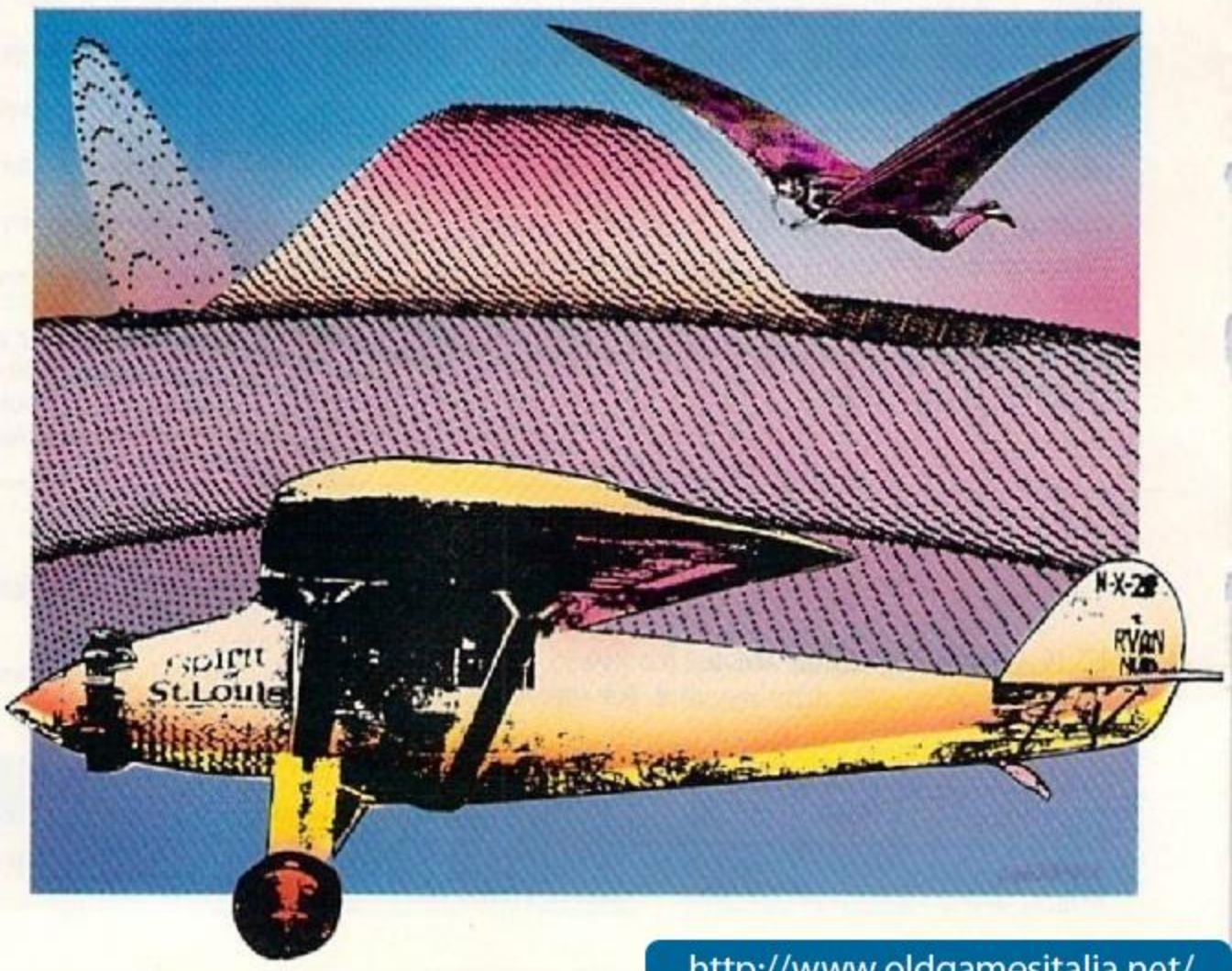
Beyond the Clouds

Your plane can "wrap around" the screen and continue from one side to the other. It cannot wrap around at top or bottom, however. Reach either of these limits, and the plane is stymied by an invisible wall. This feature was added to make the game interesting. If you'd like, you can change the program for total wraparound. (I'll tell you how later.)

This game speeds up as play continues. A delay loop initially repeats from 1 to 200 between each move. That is, the computer will count off from 1 to DLAY before it will go on with the next move. However, the variable DLAY is decreased each time, so eventually the loop has negligible effect. The computer will be counting from 1 to 1, say, and that takes next to no time at all.

Flying begins at a random level at the left side of the screen. This point, F, is selected in line 320 (line 260 in the VIC listing). The initial position of the plane, B1, is produced by multiplying F × 40 (or 22 in the case of the VIC-20) and adding CHAR, the beginning of character memory (different in both machines, but correctly defined in each program). That number, F, is used as the random row in which the plane will begin its movement.

The plane begins flying at line 380 (line 320 in the VIC listing). First, a random position for a new cloud, I, is se-



RUN It Right

Unexpanded VIC-20
Commodore 64

Address all author correspondence to David D. Busch, 5217-C Cline Road, Kent, OH 44240.

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Listing 1. Sky Pilot program for the C-64.

```
10 REM *************
20 REM *{11 SPACEs}*
30 REM * SKY PILOT *
40 REM *{11 SPACEs}*
50 REM *************
60 FOR N=1 TO 10
70 READ B
80 JV(N)=B
90 NEXT N
100 POKE 53281,1
110 VOLUME=54296
120 VCE=54273
130 PRINT"{SHFT CLR}"
140 PRINTTAB(12)"{2 CRSR DNs}{CTRL 9}{CTRL 3}SKY PILOT{
    CTRL 7}{2 CRSR DNs}"
150 PRINTTAB(9)"USE JOYSTICKS"
160 PRINTTAB(9)"TO AVOID HITTING "
170 PRINTTAB(9)"CLOUDS.{2 SPACEs}GAIN"
180 PRINTTAB(9)"POINTS FOR EACH"
190 PRINTTAB(9)"SECOND YOU STAY"
200 PRINTTAB(9)"ALIVE!"
210 PRINTTAB(11)"{2 CRSR DNs}{CTRL 9}HIT ANY KEY"
220 GET A$:IF A$=""GOTO 220
230 POKE 53281,15
240 DATA -40,40,0,-1,0,0,0,1,0,0
250 PRINT"{SHFT CLR}"
260 PLANE=107
270 CSCREEN=55296
280 CHAR=1024:B=CHAR:E=CHAR+484
290 B=CHAR:E=CHAR+999
300 DF=CSCREEN-CHAR
310 DELTA=1
320 F=INT(RND(1)*21)
330 DLAY=200
340 B1=(CHAR+F*40)-1
350 BEGN=TI
360 GOSUB 620
```

(continued on p. 124)

lected, and a white puffy ball is Poked to the screen. Then the delay loop operates, and the delay is reduced.

Motion Control

Movement of the plane deserves some discussion. We have seen how to move an object on the screen through programs previously published in Video Casino, like Draw and Invisible Maze. To keep the object constantly in motion, a variable, Delta, is always added to B1. If no joystick motion is detected, Delta remains the same, and the motion continues in the same direction. Only when the joystick is pressed in some way does Delta become another value.

In this game, each new value of Delta also causes the cursor character to change. When the plane starts, it is moving from left to right, and the cursor Poked has a value of 107. This character, T on its side pointing toward the right, looks like a plane seen from overhead, flying left to right.

When Delta becomes −40 or −22, meaning the plane is moving upward, then Plane equals 113, which looks like an upside-down T. Downward movement produces a cursor that looks like a normal T, while flying from right to left generates a cursor that is the reverse sideways T.

This is basically how professional programmers handle movement on the screen, although there can be separate characters for movement in more than just northern, southern, eastern and western directions. There will likely be several for each direction, as well, to produce smooth animation. For this game, however, four will suffice.

As the plane moves about, the program checks, in line 560 (line 500 in the VIC listing), to see if it has struck a cloud. If Peeking the plane's next location, B1, produces other than a 32, then a collision has taken place. If all is safe, then the plane is Poked, and the former position, B1-Delta, is replaced with a space (32).

A crash produces appropriate sound and visual effects, and a comparison between the starting time, BEGN, and the time of the crash. The difference between these two variables is measured in jiffies, or 1/60th second intervals, and gives you the elapsed time. If the time is longer than the previous high score, HS, then HS is reset, a new record is announced and you're allowed to play another round.

Wrapping Around

I promised some hints on changing the wraparound feature. Both programs contain program lines that keep the plane from going beyond the end of video memory, E, or the beginning, B. In the Commodore 64 listing, for example, you'll notice that lines 500 and 530 check for this.

To cause a downward traveling plane to wrap around, you'll need to change B1 to B1−((number of rows used on screen)*(number of characters in a row—22 or 40)) whenever B1 is larger than E. For an upward traveling plane, you change B1 to B1+((number of rows used on screen)*(22 or 40)) to make it appear at the bottom of the screen whenever B1 is less than B.

You can count for yourself how many rows are used by this game, and locate all the places in which the change has to be made. You have to learn *something* on your own. R

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BACK TO BASICS

When a computer becomes as popular as the Commodore 64, it's no surprise when hundreds of software programs for that particular machine appear on the market.

Along with the usual arcade games and business and spreadsheet programs, there is also an abundance of educational programs that take full advantage of all the sound and graphics features of the Commodore 64.

In this article, we'll feature some of these programs in areas such as language arts (including spelling and vocabulary improvement), mathematics, preschool enrichment and more.

Buying Educational Software

Before you shop, you should consider the following questions to help you select the correct software for your child's needs. Some of the questions and answers can also be applied to software in general.

1. Is the program appropriate for the age and ability of my child?

Children of different ages learn in different ways. Very young children (non-readers) may need more concrete instructions than an older child. Also, just because the program packaging identifies some specific age or grade range, this does not necessarily mean it is right for your child. Read the documentation to get some idea what the program demands and what it claims to teach. Better yet, ask your child's teacher about your child's ability level.

2. Is this program what my child needs?

There are many programs that are suited for specific skills such as reading, preparation for the SATs or algebra problem-solving. If you know your child's needs, then look for a program that offers instruction and practice in this specific area.

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Educational software for a wide range of ages and subjects is now available for the Commodore 64. This article reviews over 40 such programs and presents their main features in a convenient chart. So read and learn.

By Neil Salkind

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Don't accept a spelling program if vocabulary-building is what you and your child are interested in.

You should also be aware that some programs focus on *enrichment* while others focus on *remediation*. Enrichment programs help children who are already at or above their expected ability level. Remedial programs offer repetitive drills with feedback; they are designed to help children who are not yet up to their expected level of performance.

Make sure the program is appropriate for your child's ability level.

3. Can my child use the program alone?

Several programs require that a parent or a teacher be there to help get the program started. If a parent or teacher is not always present, this may be an inconvenience. Remember that a child's learning can be facilitated by constructive feedback from a parent or teacher, and that very young children will almost always need some kind of assistance.

4. Can I find the same, or a similar, program in one of the popular computer magazines?

Several computer magazines such as *RUN* offer listings of educational programs in their publications. Some also offer pre-recorded program disks. These programs are often as good as the ones that are commercially available, and they are also much less expensive.

5. Is the program I want really made for my computer?

It's surprising how many people overlook whether the software they are considering is designed for their personal computer. As a general rule, if the advertisement or packaging does not indicate such, you should assume that the program is *not* designed for your system.

Many computer stores tend to focus on one or a few computer systems, and it is likely that you can get educational software for your computer at the same store where you purchased your hardware. Be careful, however, since this is not always the case.

6. What other peripherals do I need in order to use the software?

As educational software is designed using more and more of the features of your personal computer, it seems as though more peripherals (add-ons) are necessary.

For example, light pens are becoming very popular because they increase the level of the child's involvement with the program. Be sure you ask this question of the salesperson when you are shopping. Also, be sure that the medium (disk, tape or cartridge) fits your system.

7. How easy is the software to use?

This is a difficult question to answer, since most good software takes some amount of time to learn. Thoughtful, clear documentation can make a big difference. Some good educational software is quite simple to use and also very effective.

Before you buy, ask to see the documentation. Is it printed with a 3 × 3 matrix printer, making it nearly impossible to read? Is it written clearly? Is there a troubleshooting page to help bail you out if necessary? Also, look for supplemental material along with the software, such as a teacher's or parent's guide and workbook.

8. What do the reviewers say?

Right now, there are some 200 computer publications on the market, and almost every one has a section devoted to reviewing new educational software packages.

Try to find a review of the software that you are considering. If it's a popular package, it has probably been reviewed in several publications.

Also, try to find someone who has the program and ask for his or her reaction to the product. However, different people have different software needs, so don't jump to the conclusion that if your friend did or didn't like it, you will have the same reaction. Examine it yourself.

9. How does the software actually appear on the screen?

If possible, examine the product "hands on" at the dealer. Here you and your child have a chance to actually see how the program works. It's also a great way to judge whether or not it is appropriate for your child's ability and interests. A good dealer will encourage you to try out the program, hoping you'll see the benefits it can give your child.

10. Is the software guaranteed?

Many companies guarantee that their software is error free and that they will replace any damaged disks or tapes within a certain time period. Some companies allow you to return damaged goods up to 30, 60 or 90 days after purchase. Likewise, some dealers will replace defective materials, while others will not. If you have a concern, write or call the company that manufactures the software and see if they will guarantee or warranty their product. Also, be sure to see if your dealer will stand behind what he sells.

11. Is this the latest version of the program?

As you have probably seen, software authors are always upgrading their programs. Some dealers want to get rid of old inventory and get the new versions on the shelf, so they may cut the price of the now outdated program, or not even tell you that a newer version is available. Be sure you are getting the latest version, and call the company if necessary.

12. Will the company guarantee to upgrade your software when a new version is developed?

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When you buy a new piece of educational software, the company usually includes a registration card for you to complete. When upgrades are completed, many companies will contact you and offer the opportunity to trade in your old disk or tape (plus a small fee to cover handling and postage) for a new one. Other companies charge a registration fee.

Now that you have a good idea of what to look for in a software package, let's take a look at some of the educational programs currently available for the Commodore 64.

ABC Fun

ABC Fun (Kardinal Software) is intended for preschool and kindergarten children and stresses recognition and ordering of the letters in the alphabet.

There are five different levels of play. The child is shown one to five letters, and he must indicate what the next letter in the sequence should be. If the child is correct, the letter moves toward the check mark on the screen. If wrong, the letter moves toward the "x," and the correct letter flashes.

Funbunch

Funbunch–Elementary (Unicorn Software) has six levels (grades one through six) and contains two different games. Word Flash presents the child with a word for a user-determined amount of time (from .01 to 999 seconds). After the word disappears from the screen, the child tries to retype the word correctly. Points are awarded for correct responses, and the session ends after ten words have been presented. The child can use either his own list of words or those provided on the disk. Speed Read operates in the same way, except that words and sentences up to 38 characters long can be entered.

Both games have colorful graphics. Each player is allowed to reach 100 points regardless of how often he is incorrect. The games are highly animated, including interesting sound effects and a Computer Doodle game (used as a reward).

Funbunch–Intermediate offers the same games and design as Funbunch–Elementary, with the difference that the user is asked to select a group of words from the computer's list, rather than a grade level. All other options and operations are identical.

Spellbound

Spellbound (Timeworks, Inc.) is an arcade-like spelling program that offers 10 levels of difficulty and allows the child, the parent or the teacher to input a separate list of words for individualized practice.

The child uses a joystick to move a bee and "sting" the correct letters of the word in the proper order. Depending upon the level of play, the bee may be able to cross its own path. The speed of the bee and the number of letters that appear on the screen increase with each difficulty level. Extra points can be obtained by stinging bee hives when they appear, which can also be used as an escape option if the child gets into trouble.

Individualized lists of words can be saved for later use. Pausing in the middle of a game is possible, and the child gets three tries for each word.

Fay: The Word Hunter

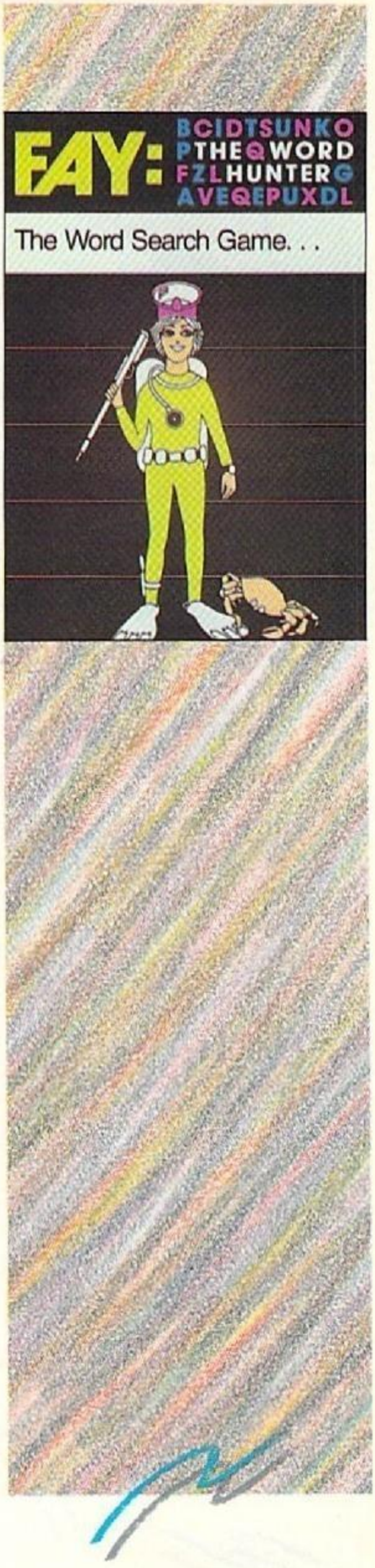
Fay: The Word Hunter (Didatech Software) is a word-recognition drill that combines interesting graphics and sound in an underwater setting. Fay is a scuba diver trying to locate words in a grid of letters that corresponds to the words appearing at the bottom of the screen. The student uses Fay's laser to shoot the words down before time (100 seconds) or laser shots (12) run out.

The program has six different levels (or lists of words), and the high score is recorded on the disk under the player's name.

Young Folks Series

This series, from Island Software, includes three separate games that focus on letter discrimination. The child is required to identify which of four letters is different from the other three, or which letter among a set of five is the same as the individual letter on the left side of the screen.

By pressing the S key, a comprehensive summary is produced for the teacher or parent, revealing which of



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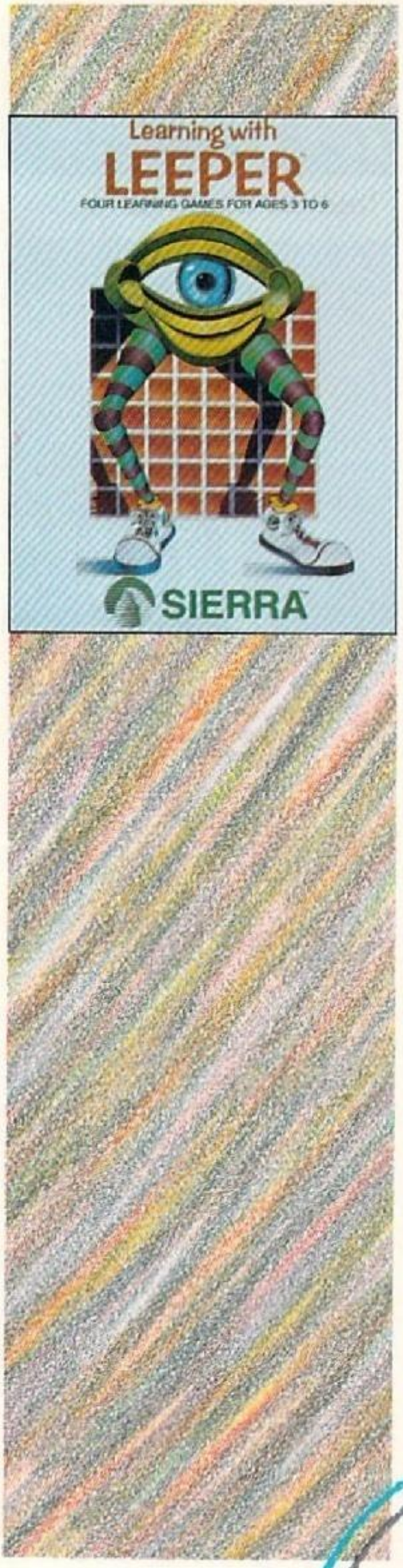

the 20 letter matchups the child missed, such as b/d, l/i, or V/W. One nice feature of the program is the optional use of a light pen to indicate choices, which is especially useful for non-readers.

Hodge Podge

Hodge Podge (Artworx Software, Inc.) is designed for preschoolers and focuses on number and letter recognition. It includes songs, pictures of animals and note scales.

The program presents the child with a short, animated vignette corresponding to the key that is pressed. For example, when the child presses the letter Q, a green worm (labeled as "quick worm") squiggles across the screen. The N key produces a number line. Each little vignette is also accompanied by a song, with the names of the notes in the song (such as Do, Re, Mi) appearing in the lower left-hand corner of the screen.

Word Attack!

This vocabulary builder, from Davidson & Associates, uses a master list of 675 words and four different exercises.

In all four exercises, words are presented to the child at one of nine levels in the verb, adjective and noun categories. The child can choose between Word Display (where he sees words with their meanings and how they are used), Multiple Choice Quiz (the child matches words with their meanings or the meanings with the words), Sentence Completion (the child completes a sentence by providing the missing word), and Word Attack! (an arcade-style game in which the child shoots down the correct meaning of a particular word).

The package includes both data and program disks, and it allows for individualized entry of words and review of incorrect responses. Extensive documentation is included. Four additional data disks with 500 words and 20 word lists each are available.

M-ss-ng L-nks

M-ss-ng L-nks (Human Engineered Software) is designed to improve language skills, including spelling and reading, by requiring the child to identify missing letters and words in passages from nine different stories, such as *Charlie and the Chocolate Factory* and *Little House in the Big Woods.*

For each of the nine stories, there are nine passages available from which to choose, and there are nine different levels of clues available. Comprehensive feedback is given in the form of scores: the percentage of correct guesses on first and later tries is given, and correct answers are provided.

Word Spinner

Word Spinner (The Learning Company) requires the child to fill in a wheel of spaces using clues provided by the program. The user can set characteristics such as word size (three- or four-letter words), position of blank spaces and the letter pattern (e.g., words ending in "ig" or "on"). After points have been earned by completing the wheel, the child spins for a prize.

The game can be played against a timeclock, and the program allows the child to cycle through the alphabet until he finds the letter combination with which to work. Another option allows the printing of the words when the game is finished.

Learning with Leeper

This program package, from Sierra, features four games for preschoolers, concentrating on number concepts and reading-readiness skills.

The child chooses a game from a menu by moving the joystick and pressing the fire button. In Dog Count, the child tries to feed the dogs the proper number of bones. Balloon Pop requires the child to match the displayed shape with one of the shapes on the bottom of the screen. Leap Frog is a simple maze game where a frog tries to outrun a caterpillar and avoid hitting the wall. Screen Painting is a draw-and-paint program, containing a variety of outlined pictures for the child to color.

Preschool IQ Builders

This is a set of programs intended for ages three to six. The programs are designed to teach the concept of same or different and enhance the recognition

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of shapes, letters and numbers.

Sammy The Sea Serpent and The Adventures of Oswald are interactive stories that focus on the development of listening and motor skills. Teddy's Magic Balloon is an interactive story with voice narration that stresses listening, matching and following directions. Picture Blocks presents a series of shapes that can be used to create original pictures or to match patterns generated by the computer. For each of the four games, there are several levels of difficulty. (Program Design, Inc.)

Remember that the very young child will always need some kind of assistance.

Facemaker

Facemaker (Spinnaker Software) provides the child with a canvas on which he can paint and animate a face or play a memory game where sequences of face changes presented by the computer must be matched. The game provides an understanding of how events occur in a sequence, and it familiarizes the child with the idea of programming a computer to follow a set of instructions.

Building a face includes choosing from a variety of noses, mouths, eyes, ears and hairstyles. Once a face is built, it can be animated with winking, frowning, smiling, crying and ear wiggling. As the computer animates the face created by the child, the child must program the face to match the actions of another face on the screen.

Early Games for Young Children

This is a set of exercises for ages three to six. The exercises concentrate on familiarizing the child with the computer keyboard and its functions through matching and discrimination exercises.

From the picture menu, the child selects one of nine games. Match Numbers presents a single digit from 0 to 9, and the child must press the corresponding key. Count requires the child to press the numeral that corresponds to the number of blocks on the screen. Add displays two sets of blocks with an equals sign separating them. The child presses a key (the total is always less than nine) to indicate the total. Subtract has the same format as Add. Match Letters is identical in format to Match Numbers, but requires the matching of letters.

Alphabet helps the child learn the sequence of the letters in the alphabet. After seeing the letter on the screen, the child must press the key that corresponds to the next letter in correct sequence. Names uses parent or teacher input of the child's name, and the child can practice typing his or her name. Compare Shapes displays four shapes on the screen and the child determines which shape is different. Picture Draw is a drawing program that can save completed pictures and retrieve previous ones. (Springboard Software, Inc.)

Kids On Keys

Kids On Keys (Spinnaker Software) is designed for ages three to nine. It combines letters, numbers and words in three different exercises.

Letters and numbers float down the screen in Game 1, and the child must press the matching key before the letter or number reaches the bottom of the screen. Game 2 requires the child to type in the word that identifies a picture floating down the screen. In Game 3, a set of five numbered pictures is displayed, and the child must match the number that corresponds to the word on the bottom of the screen.

All three games have several levels and excellent sounds and graphics.

The Factory

The Factory (Human Engineered Software) is a unique exercise for ages seven through adult. It emphasizes shape recognition and spatial skills, including visualization and manipulation.

As the director of a factory, the player must produce products that have certain characteristics, such as stripes of different widths or punched holes of different shapes. The program can also present shapes that have to be matched. Sequencing and patterning are stressed. This is a challenging program with good animation.

Moptown Parade

This game of logic provides practice with sequences and patterns of events for ages six to ten. These are skills that children need in their educational development, but are often ignored in the formal classroom settings.

Each of the "moppets" that inhabits Moptown is one of sixteen characters organized along the attributes of fat/thin, tall/short, red/blue and "bibbits" or "frabbits."

The seven games require the child to make an exact twin of the moppet on the screen, choose which moppet in a set of four is different, find the similarity among a set of four moppets, create an opposite moppet to the one on the screen, figure out which moppet comes next in a sequence of moppets, decide

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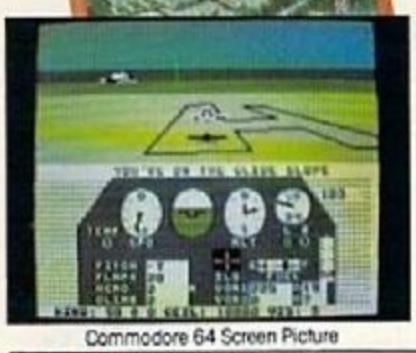

Commodore 64 Screen Picture

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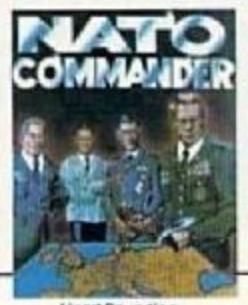

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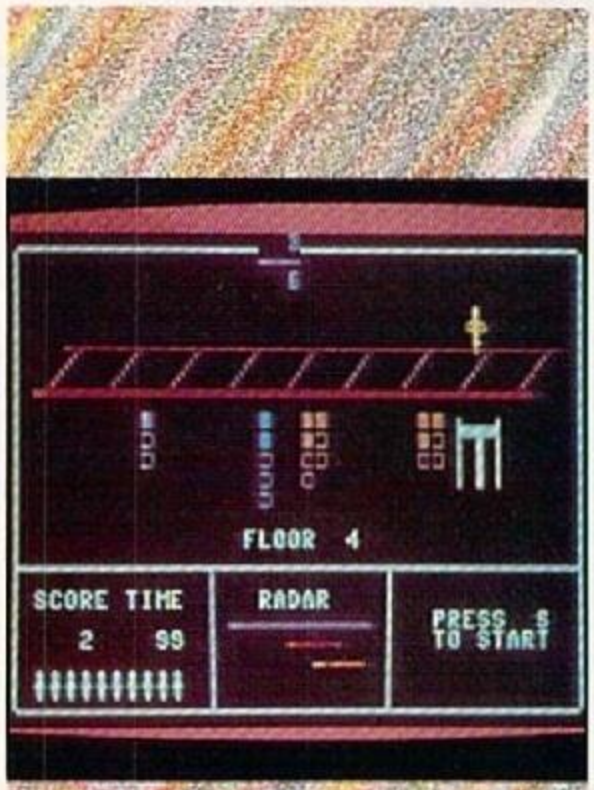

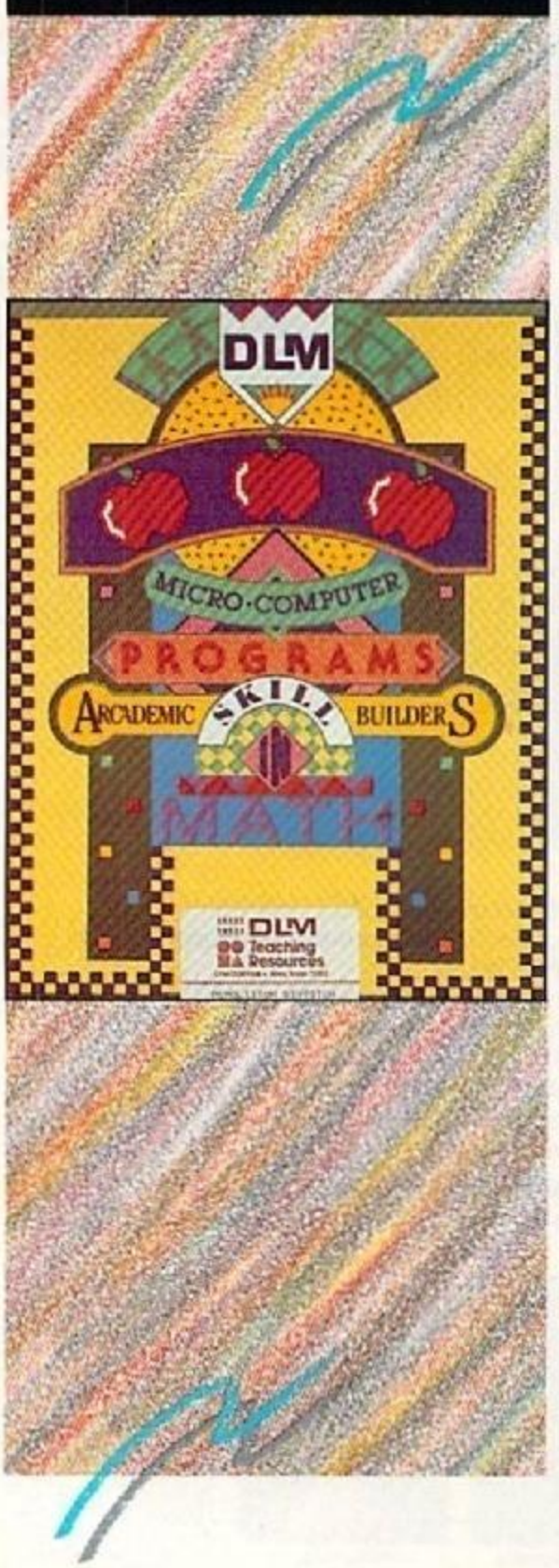

which moppet comes next in a parade and figure out the characteristics of moppets that are allowed into the clubhouse. Supplementary cards are included for practice, and the graphics (done by an 11-year-old) are outstanding! (The Learning Company.)

Fraction Fever

Fraction Fever (Spinnaker Software) is a cartridge-based animated exercise with ten different levels. It requires the child to search for the fraction picture that matches the actual fraction. When the correct fraction is located (before the time limit expires), the student must press the space bar or joystick button to advance up an elevator to the next floor.

On each floor, the student moves across blocks in search of the correct fraction. The program stresses recognition of correct fractions.

Fraction Factory

This is a set of teaching programs that provides excellent feedback for incorrect answers. The program attempts to point out the mistake and correct the problem-solving process by demonstrating the correct solution.

Fractions and Sets requires the child to indicate with a fraction the part of a whole object that is enclosed in a box. Equivalent Fractions presents fractions represented as colored bars divided into three different colored pieces. The student must identify how many bars are needed to equal the fraction represented on the left.

In Fractions of a Number, a box filled with objects is shown with a fraction. Not all of the objects are visible. The student must determine the total number of objects using the fraction given.

Finally, Adding and Subtracting Fractions provides practice using two fractions with different denominators. A number line is used to assist the child. (Springboard Software, Inc.)

Multi-Beci

Multi-Beci (Boston Educational Computing, Inc.) is a multiplication drill for preschool and elementary school children. There are a variety of options that can be selected from the on-screen instructions, including timing and the number of digits (from one to four).

The student is required to complete each problem by filling in the proper number where the arrow points. There is no feedback for correct or incorrect responses; however, incorrect responses appear in a different color.

Arcademic Skill Builders in Math

The six programs in this series, from DLM Teaching Resources, are designed to teach fundamental math skills using the action and graphics of arcade games. The student, parent or teacher can select game-control options for speed, content, time and paddle or keyboard control.

Meteor Multiplication is a fast-moving multiplication drill that is very much like an arcade-style game. The child uses the controls to select an answer to the problem. He then directs and fires a gun to shatter the invading meteors. An incorrect answer can lead to the destruction of the star station.

Demolition Division is a division drill that is very similar to Meteor Multiplication in the setting of game parameters. The goal is to shoot a tank with your gun by solving the division problem before the tank's salvos break down your wall and destroy your guns. The program offers excellent and extensive supplemental materials, such as a teacher's manual and flash cards.

In Minus Mission, the student places the answer to a subtraction problem in the robot and fires the laser to shoot down the correct answer. It is a fast-moving game that stresses quick responses to subtraction problems. Also included with the software are materials for graphing student progress.

Alien Addition is almost identical to Minus Mission, except that the focus is on addition problems. The same options, as well as supplemental materials, are available.

Alligator Mix is a fast-paced exercise that drills the student in both addition and subtraction. The student controls an alligator that must eat an apple containing a problem that matches the answer appearing in the alligator's stomach. The student must also have the alligator eat mismatches between problems and answers. As in other DLM games, speed and difficulty are controlled and a summary of performance is presented. In addition, supplemental

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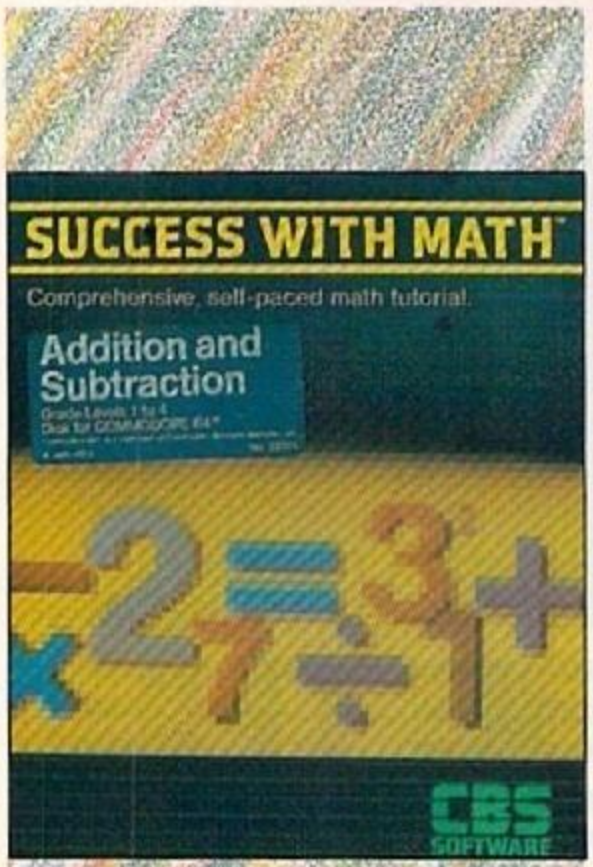

materials, such as flash cards and a teacher's manual, are included.

Dragon Mix combines multiplication and division drills using digits 1 through 9. A friendly dragon shoots down spaceships containing multiplication and division problems before they can strike and destroy the city. The drilling program is accompanied by extensive supplemental materials.

Success with Math

This is a series of mathematics programs from CBS Software. The first program in the series focuses on addition and subtraction for grades two through eight. The second focuses on multiplication and division for grades seven through twelve. Each program allows the student, parent or teacher to determine the level of difficulty and the number of problems.

These programs are excellent for drilling in these areas and for helping the child to understand what the concept of "carrying" means. The programs are more suitable for practice than for teaching, however. Other programs in the series deal with fractions, decimals and linear and quadratic equations.

Comparing Whole Numbers

This package, from Creative Equipment, contains both a cartridge and a disk. Designed for children in the primary grades, it teaches the concepts of greater than, less than and equal to.

The program presents a series of word problems that ask the student to decide the relationship between two quantities. If a response is wrong, the program presents another problem at a similar level, using new numbers. If the student continues to answer incorrectly, the program reviews the basic concepts. Worksheets, as well as pretest and posttest materials, are included, along with information for teachers.

Numer-Beci

Numer-Beci (Boston Educational Computing, Inc.) contains five basic number exercises and is designed for ages three to six. The exercises are Count Like Things, Count Unlike Things, Count Color, Count Shapes and Count Colors and Shapes.

In each exercise, the left side of the screen shows the set of objects, and the right side displays the child's answer. Numer-Beci has five levels of play, with a graphics reward for correct answers to all ten problems.

10 Little Robots

This is a series of five exercises that stress basic mathematical concepts. Little Robot Story teaches the concept of subtraction through the presentation of an interactive rhyme. Count the Robots requires the child to count the randomly-generated number of robots and press the corresponding key. Robot Letter Match requires the child to type the letter that matches the one in the robot's box. Robot Addition provides more addition practice. Robot Drawing is a joystick drawing program. (Unicorn Software.)

123 Fun

123 FUN (Kardinal Software) contains two exercises with five levels of play. The first game displays a number of objects (up to 20) and asks the child to press the correct key. The number is then spelled out. A number line is also used, giving the child some idea about the quantitative nature of mathematics. In the second game, objects (such as hats or rocket ships) are displayed, and the child is asked to center the correct number. At the end of each game, a tally of correct and incorrect answers is given.

Fay: That Math Woman

This program offers six different exercises in the basic concepts of addition, subtraction, multiplication and division. It accomplishes this by using a number line for all operations and by changing the way in which Fay teaches. While she goes step by step along the number line in addition problems, she hops by even steps in division, showing how numbers can be grouped. In each of the six exercises, there are five different levels, and Fay travels from one to the next by the means of an elevator.

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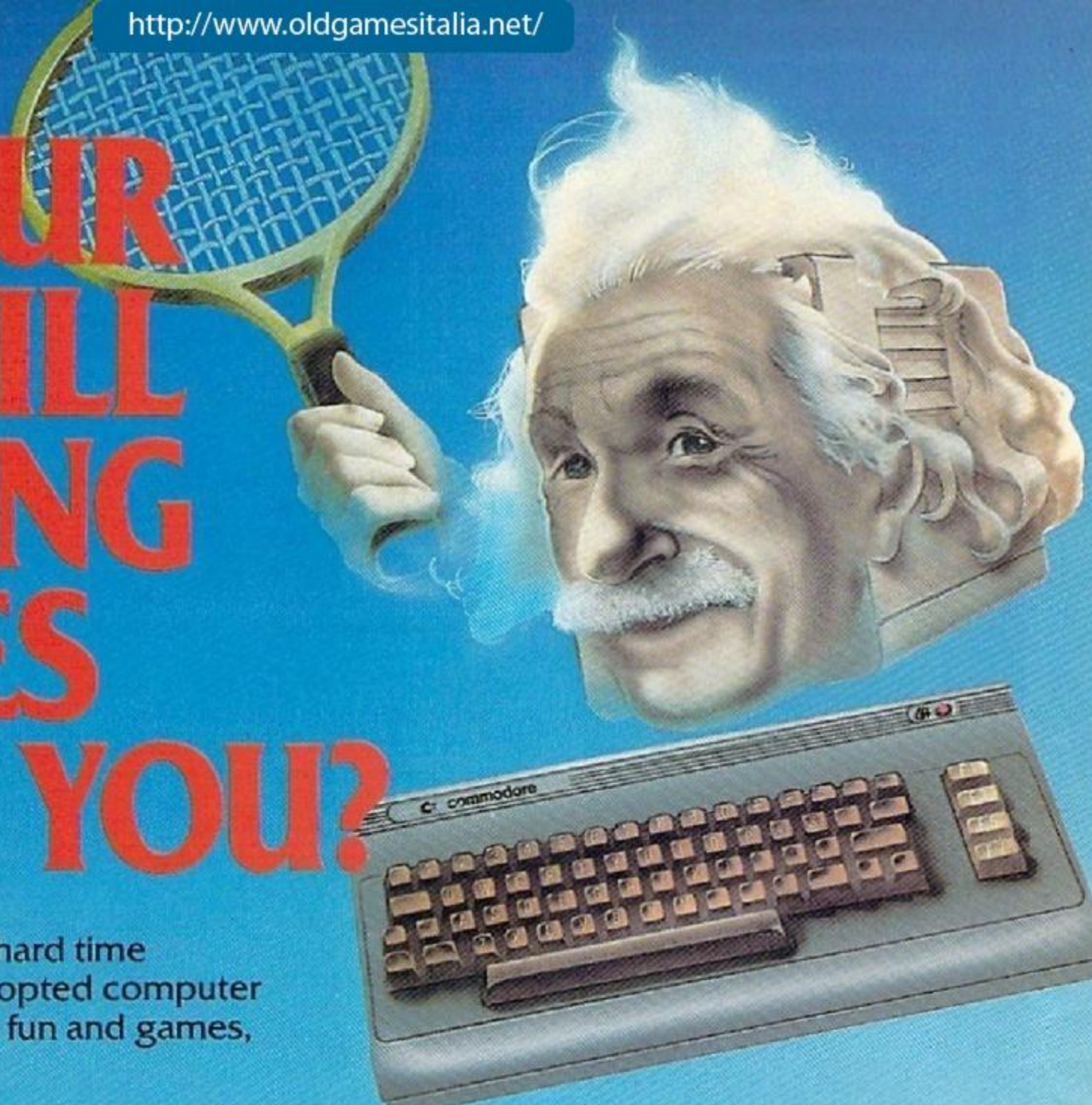

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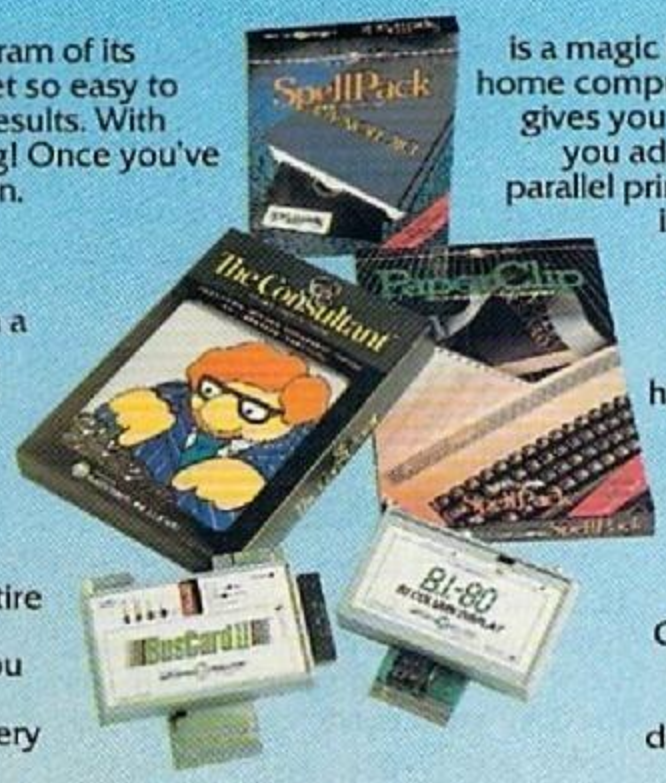

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mathematical subjects

The graphics are uniquely tied to the learning objectives. When the child is incorrect, Fay taps her foot in disapproval and will eventually show the child using the number line how the correct answer can be reached. (Didatech Software.)

Ships Ahoy

Ships Ahoy (Unicorn Software) consists of four exercises that provide drills in the areas of addition, subtraction, multiplication and division. The level of difficulty and the amount of time allowed for each problem is set by the user.

Ships Ahoy requires the child to answer basic mathematics problems. When 10 correct answers are reached, a hi-res graphics display is given as a reward. Mine Sweeper requires the child to move his joystick in the direction of the mine containing the correct answer to the math problem displayed at the top of the screen. Sailor Sam checks the answer, and after three incorrect answers, the program displays the correct one. Treasure Hunt is a maze game, and Sailing Sketch is a joystick drawing program.

Race Car 'Rithmetic

Race Car 'Rithmetic (Unicorn Software) provides drills in the areas of addition, subtraction, multiplication and division. There are three difficulty levels for the drills.

The object of each exercise is to answer the problem at the top of the screen and move the race car towards the finish. If the child scores above 90%, a simple Race Car Game is provided as a reinforcer.

Mathematics

Mathematics (Cymbal Software, Inc.) is a two-disk package that covers a broad range of mathematical concepts. Level 1 of disk 1 contains addition, subtraction, multiplication, division, fractions, percentages, decimals, a one-player game and a two-player game. Each of these activities contains a variety of options (including drills), as well as a final exam where the student is tested on some of the information that has been presented in the lesson.

Two unusual features of this comprehensive package are the use of a template to help the student with the meanings assigned to the function keys, and an attempt to teach advanced concepts, such as geometry.

MathWiz

MathWiz: Series 1 (Merritt Software, Inc.) is a math tutoring program that emphasizes the basic concepts of addition, subtraction, multiplication and division. The student chooses one of six files, such as mixed number addition or mixed number subtraction. The available drills are Howie Adds, Howie Subtracts, Howie Multiplies and Howie Divides. Howie is a fictitious character who appears during the various drills and testing.

The student chooses the number of problems that he wishes to do, as well as the percentage of correct answers that will be acceptable (from 0 to 100%). The program includes frequent drills and a well-documented manual for teachers and parents.

Elementary Math Package

This package offers instruction and drill in place value and numerals. The student selects an activity and is then drilled in that specific area. The program will not continue in its sequence if an answer is incorrect. Instead, it waits for the correct answer before moving on. (Micro Learningware.)

Challenge Math

Challenge Math (Sunburst Education) is a set of three programs that are designed to provide practice in basic addition, subtraction, multiplication and division.

Alien Intruders requires the student to find the correct answer to simple number problems before being eaten by a dragon. Digitosaurus requires the student to judge which of three problems will give the largest answer; the student types in the correct answer, and in doing so the dragon grows older and older. Math Mansion requires the student to

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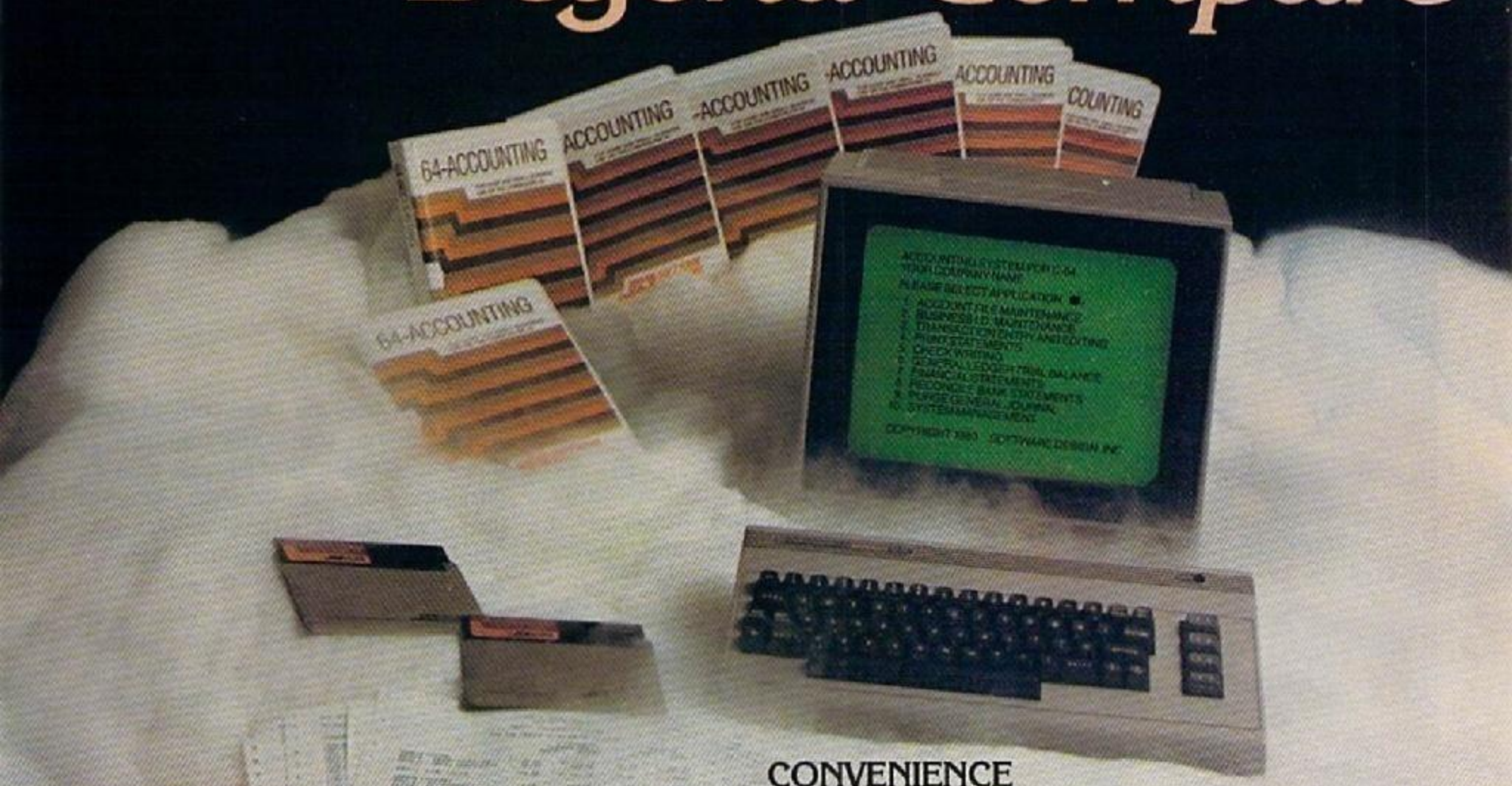
64 Software Beyond Compare



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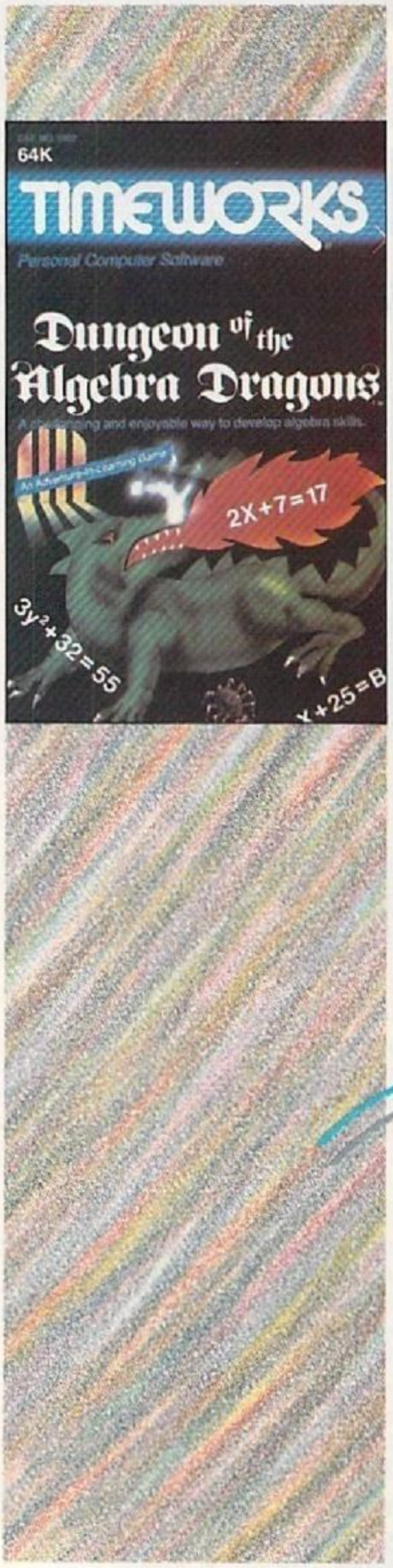

work backwards, creating a problem for a certain answer. Worksheets and a teacher's guide provide a complete educational package.

Addition Magician

Addition Magician (The Learning Company) is a unique addition exercise involving a forgetful, but delightful, wizard. Using a joystick, the object of the exercise is to draw a box around a set of numbers that add up to some predefined total. The student sets the amount of the total (up to 20), the number of turns allowed for finding the correct answer (up to 20) and the time (fast, medium or slow). A two-player option is available, as are several games such as Tic-Tac-Number and Numbergram.

Add-Sub

Add-Sub (Boston Educational Computing, Inc.) offers extensive on-screen instructions in an addition and subtraction drill program targeted at ages five to nine. The number of digits, the option to have carrying and borrowing, the use of decimal points and the length of time the student has to answer are all selected by the user.

All numbers are presented in an oversize format and in color, with an arrow prompting the student as to where the answer should be placed.

Survival Math

Survival Math (Sunburst Education) is a comprehensive and entertaining set of four programs designed to help teach math skills. Travel Agent requires the child to work within a given budget and plan a trip. Smart Shopper Marathon is a supermarket shopping trip where students are timed as they try to make the best selections. Hot Dog Stand requires the planning and record-keeping involved in running a hot dog stand. Foreman's Assistant requires the student to construct a room by transforming measures in area and perimeter.

The most valuable components of the program are the extensive supplementary materials for teachers and parents, including worksheets and performance summaries.

Dungeons of the Algebra Dragons

This is an adventure game consisting of four levels and 20 rooms. The student is locked in a dungeon and must make his way to freedom by searching through the dungeon for two magic keys. The student begins with 1000 pieces of gold. When dragons are encountered, an algebra problem must be solved. If the child is correct, then the pile of gold becomes larger. If the child is incorrect, the pile of gold gets smaller. When the gold runs out, the dragon eats the little on-screen figure!

There are various pitfalls, such as trap doors, ghosts and spiders. This is basically a well-designed game that drills, rather than teaches. (Timeworks, Inc.)

TEC4

TEC4 (Teaching Technology) presents addition, subtraction, multiplication and division problems ranging in difficulty from the kindergarten level through grade six. Extensive documentation takes the user through the program, giving a detailed explanation of each screen. The student, teacher or parent can choose what set of "tables" to work with (twos, threes, etc.) and the difficulty level. Incorrect responses to any problem result in direct feedback.

A mouse-like character guides the student through the various options in the program. This character appears on the screen as a teacher, complete with a pointer and a bugle that sounds when the student is correct. The Master Menu offers the chance to review work or change the options for types of problems, grade level and so forth. Some good features of the package are the spiral binding of the documentation (it lies flat when open!), multiple copies of the program on the disk, a five-year warranty and the non-violent nature of the program. R

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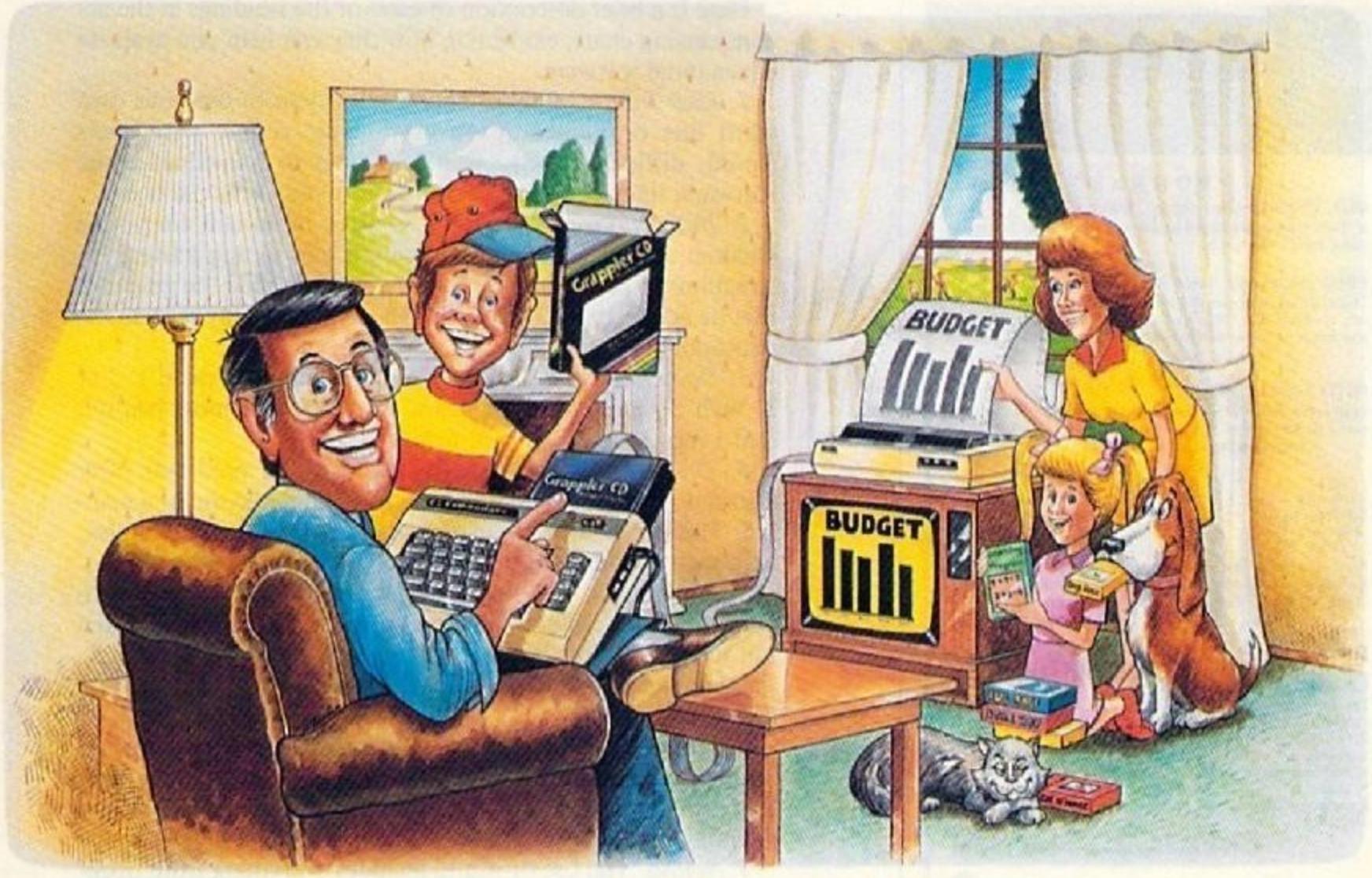

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Table 1. Descriptions of headings in the accompanying chart of program features.

Here is a brief description of each of the headings in the accompanying chart, explaining how they can help you evaluate educational software.

1. User Input. Many programs allow you to use your own word lists or number problems, or set certain parameters (speed, difficulty, etc.). This helps you to individualize the software, making it more responsive to your personal needs.

2. Instructions to Parents. It is often important for young children to have some kind of assistance in getting started. Instructions to parents can help you give your child the guidance that he needs. It also helps you to become more involved in the educational process.

3. Documentation. Software documentation is rated 1, 2 or 3, with 3 representing the most extensive and most helpful, and 1 representing the least helpful.

4. On-Screen Instructions. Some software programs offer instructions on the screen and do not require the use of a manual. This can be helpful, especially if the program is complex, with many commands to remember.

5. Non-reader Use. For such basic skills as letter and number recognition, discrimination and matching, reading is often not necessary. For the young child, programs that do not require any reading are much easier to use and can also be more effective.

6. Animation. Graphics are used to illustrate the concept and add to the impact of the overall presentation. Although the use of graphics may be entertaining, it does not always guarantee that the program is educationally effective.

7. Sound. The use of sound includes everything from opening songs to audio feedback when the user answers correctly or incorrectly.

8. Feedback. Feedback is an essential part of the learning process. It can be in audio or video form, and it can be general or specific. An example of general feedback might be "Good, Sara. You are right!" An example of specific feedback might be, "You spelled the word 'place' wrong. Please try again." The more extensive and direct the feedback, the more effective the program will be.

9. Summary of Performance. Many programs summarize the student's performance. This is especially useful for teachers since it gives them an idea where the student might be having difficulty. For example, one program lists all the spelling words in the program and shows the teacher (and the student) all the words that were misspelled.

10. Age Levels. This is the approximate range of ages that the manufacturer recommends as appropriate for the software.

11. Supplementary material. Many of the best programs offer other materials to help the parent or teacher use the software effectively. For example, supplementary graphics can be used to chart student progress.

12. Overall Rating. This is a subjective rating from 1 (poor) to 5 (excellent). One thing that characterizes excellent from good software is that excellent software *teaches* a concept or an idea, while good software provides only drills. Also, excellent software includes helpful instructions for parents or teachers, and it also provides helpful materials to assist in the learning process.

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Vendors	Programs
Artworx Software, Inc. 150 North Main St. Fairport, NY 14450	Hodge Podge
Boston Educational Computing, Inc. 78 Dartmouth St. Boston, MA 02116	Multi-Beci Numer-Beci Add-Sub
CBS Software One Fawcett Place Greenwich, CT 06836	Success With Math
Creative Equipment 6864 W. Hagler St. Miami, FL 33144	Comparing Whole Numbers
Cymbal Software, Inc. 250 Don Park Road, Unit 17 Markham, Ont., Canada L3R 2V1	Mathematics
Davidson & Associates 6069 Groveoak Place, #12 Rancho Palo Verdes, CA 90274	Race Car 'Rithmetic Word Attack!
Didatech Software, Ltd. 549-810 West Broadway Vancouver, BC, Canada V5Z 4C9	Fay: The Word Hunter Fay: That Math Woman
DLM Teaching Resources One DLM Park Allen, TX 75002	Alien Addition; Alligator Mix Demolition Division; Dragon Mix Meteor Multiplication; Minus Mission
Human Engineered Software 150 North Hill Drive Brisbane, CA 94005	M-ss-ng L-nks The Factory
Island Software Box 300 Lake Grove, NY 11755	Young Folks Series
Kardinal Software Virginia Microsystems 13646 Jefferson Davis Highway Woodbridge, VA 22191	ABC Fun 123 Fun
The Learning Company 454 Middlefield Road Menlo Park, CA 94025	Addition Magician Moptown Parade Word Spinner
Merritt Software PO Box 1504 Fayetteville, AR 72702	MathWiz
Micro Learningware Highway 66 South, Box 307 Mankato, MN 56002	Elementary Math Package
Program Design, Inc. 95 East Putnam Ave. Greenwich, CT 06830	Preschool IQ Builders
Sierra Sierra On-Line Building Coarsegold, CA 93614	Learning With Leeper
Spinnaker Software Corp. 215 First St. Cambridge, MA 02142	Facemaker Fraction Fever Kids on Keys
Springboard Software, Inc. 7807 Creekridge Circle Minneapolis, MN 55435	Early Games for Young Children Fraction Factory
Sunburst Education 39 Washington Ave. Pleasantville, NY 10570	Challenge Math Survival Math
Teaching Technology 3809 Adell Road Columbus, OH 43228	TEC4
Timeworks, Inc. 405 Lake Cook Road Deerfield, IL 60015	Dungeons of the Algebra Dragons Spellbound
Unicorn Software Co. Liberace Plaza, Suite 8 1775 East Tropicana Ave. Las Vegas, NV 89109	Funbunch-Elementary Funbunch-Intermediate 10 Little Robots Ships Ahoy

Table 2. Vendors of the programs reviewed.

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	User Input	Instructions to Parents	Documentation (on scale of 1-3; 3 high)	On-Screen Instructions	Non-Reader Use	Animation	Sound	Feedback	Performance Summary	Age Levels	Supplementary Material	Overall Rating (on scale of 1-5; 5 high)	Price
Hodge Podge	N	N	2	N	Y	Y	Y	-	-	3-6	N	5	$ 21.95
ABC Fun	N	N	1	N	Y	Y	N	Y	Y	3-6	N	3	$ 14.95
Spellbound	Y	N	3	N	N	N	Y	Y	N	6-10	N	4	$ 24.95
Young Folks Series	N	N	2	Y	Y	N	N	Y	Y	3-6	N	4	$100.00
Fay: The Word Hunter	Y	N	2	N	N	Y	Y	N	N	6-10	N	4	$ 34.95
Funbunch-Elementary	Y	Y	2	Y	N	N	Y	Y	Y	6-11	N	4	$ 39.95
Funbunch-Intermediate	Y	Y	2	Y	N	N	Y	Y	Y	6-10	N	4	$ 39.95
Word Attack!	Y	Y	3	Y	N	Y	Y	Y	Y	4-12	N	5	$ 49.95
M-ss-ng L-nks	Y	Y	3	Y	N	N	Y	Y	Y	14-18	N	5	$ 19.95
Word Spinner	Y	Y	3	Y	N	Y	Y	Y	Y	6-10	N	5	$ 34.95
Learning With Leeper	N	Y	3	N	Y	Y	Y	Y	N	3-6	N	4	$ 29.95
Preschool IQ Builders	N	Y	2	N	Y	Y	Y	Y	N	3-6	Y	4	$ 26.95
Facemaker	Y	Y	2	Y	Y	Y	Y	Y	-	3-6	N	5	$ 34.95
Early Games for Young Children	N	Y	3	Y	Y	Y	Y	Y	N	3-6	N	5	$ 34.95
Kids on Keys	N	Y	3	N	Y	Y	Y	Y	N	3-9	N	5	$ 29.95
The Factory	Y	Y	3	N	Y	Y	Y	Y	-	7 up	N	5	$ 19.95
Moptown Parade	Y	Y	3	Y	N	Y	Y	Y	N	6-18	N	5	$ 39.95
Fraction Fever	N	N	2	N	Y	Y	Y	N	N	7 up	N	4	$ 34.95
Fraction Factory	N	N	3	N	Y	Y	Y	Y	Y	7-13	N	5	$ 29.95
Multi-Beci	Y	Y	2	Y	N	Y	N	N	N	7-13	N	4	$ 24.95
Meteor Multiplication	Y	Y	3	N	N	Y	Y	N	N	7-13	Y	5	$ 34.00
Demolition Division	Y	Y	3	N	N	Y	Y	N	N	7-13	Y	5	$ 34.00

Features of Educational Programs Reviewed

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	User Input	Instructions to Parents	Documentation (on scale of 1-3; 3 high)	On-Screen Instructions	Non-Reader Use	Animation	Sound	Feedback	Performance Summary	Age Levels	Supplementary Material	Overall Rating (on scale of 1-5; 5 high)	Price
Minus Mission	Y	Y	3	N	N	Y	Y	Y	Y	6-18	Y	5	$ 34.00
Alien Addition	Y	Y	3	N	N	Y	Y	Y	Y	6-18	Y	5	$ 34.00
Alligator Mix	Y	Y	3	N	Y	Y	Y	Y	Y	6-10	Y	5	$ 34.00
Dragon Mix	Y	Y	3	N	N	Y	Y	N	N	7-13	Y	5	$ 34.00
Success With Math	Y	N	1	Y	N	N	N	Y	Y	7-18	N	3	$ 24.95
Comparing Whole Numbers	N	Y	2	Y	N	N	N	Y	Y	7-13	Y	4	$ 39.95
Numer-Beci	Y	Y	2	Y	N	Y	N	Y	Y	3-6	N	4	$ 24.95
10 Little Robots	N	N	2	Y	N	N	Y	Y	Y	3-7	N	3	$ 39.95
123 Fun	N	N	1	N	Y	Y	N	Y	Y	3-7	N	3	$ 14.95
Fay: That Math Woman	Y	N	2	Y	N	Y	Y	Y	Y	7-13	N	5	$ 29.95
Ships Ahoy	Y	Y	2	Y	N	N	Y	Y	Y	5-13	N	4	$ 39.95
Race Car 'Rithmetic	Y	Y	2	N	N	Y	Y	Y	Y	5-13	N	3	$ 39.95
Mathematics	Y	N	2	Y	N	N	Y	Y	N	7-13	N	5	N/A
MathWiz	Y	Y	3	Y	N	N	Y	Y	Y	7-13	Y	3	$100.00
Elementary Math Package	Y	N	1	Y	N	N	N	Y	Y	7-13	N	4	$ 50.00
Challenge Math	Y	Y	3	Y	N	Y	Y	Y	Y	6-10	Y	5	$ 55.00
Addition Magician	Y	Y	3	N	Y	N	Y	Y	N	6-10	N	4	$ 34.95
Add-Sub	Y	Y	2	Y	Y	Y	N	N	N	5-9	N	4	$ 24.95
Survival Math	Y	Y	3	Y	N	N	N	N	Y	6-10	Y	5	$ 55.00
Dungeons of the Algebra Dragons	N	N	3	Y	N	Y	Y	N	N	14-18	N	4	$ 24.95
TEC4	Y	Y	3	Y	Y	Y	Y	Y	Y	6-10	Y	5	$ 39.95

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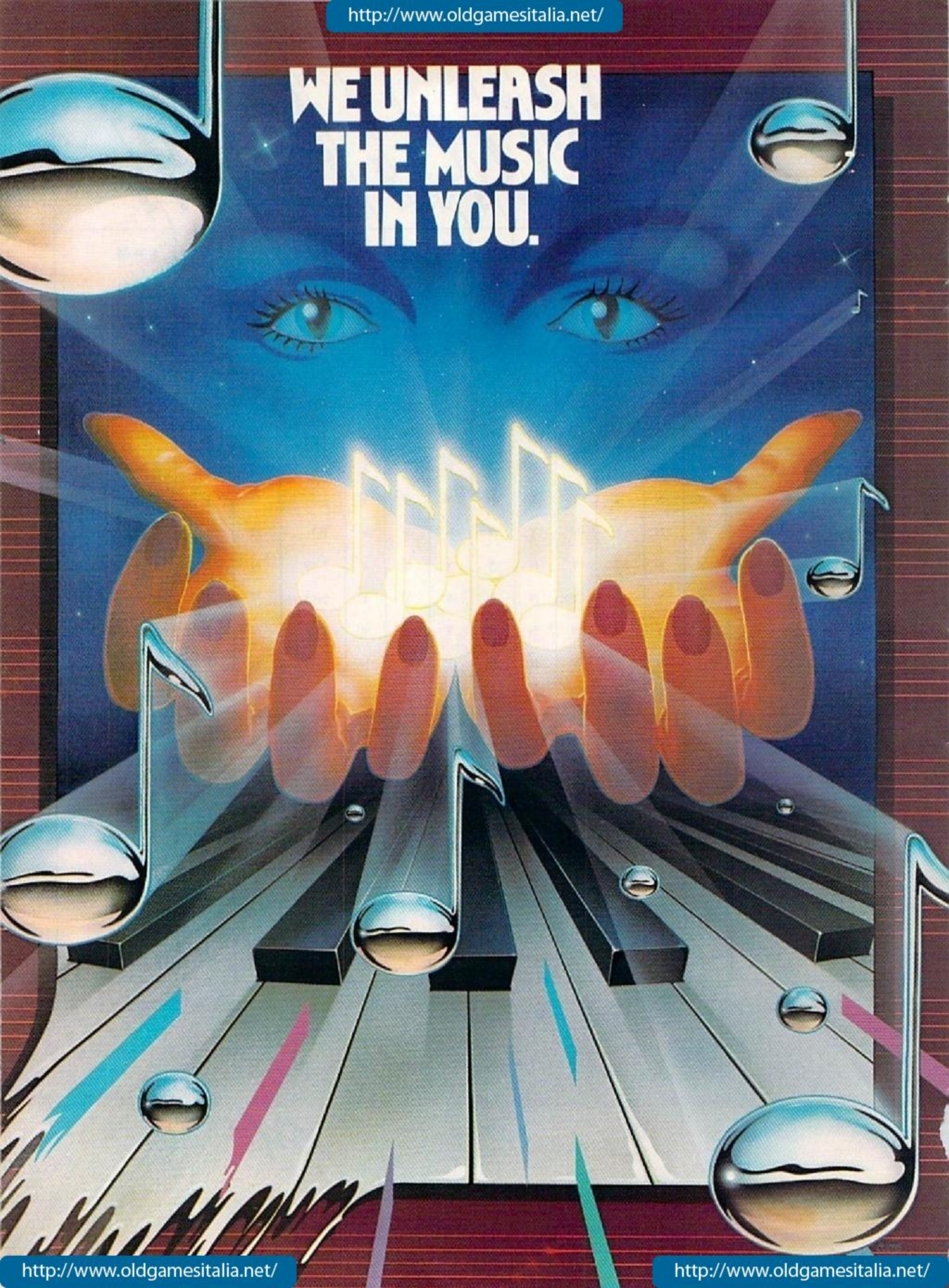

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I began writing the 64 Speller to help my seven-year-old daughter with her weekly spelling lessons. I wanted the C-64 to prompt her to spell a word, then to check to see if she had spelled it correctly.

The major problem was coming up with an interesting and usable prompt, one that wouldn't display the word. A speech synthesizer would have been nice, but I didn't have one. The solution was to offer a definition of a word, then let her spell the word it defined. This approach turned up a plus, because the display of the definition increased the learning.

What's It All About?

This program not only reinforces spelling, but also knowledge of word meanings and awareness of the keyboard. And the 64 Speller is enjoyable. It's full of sound—nice sounds when the child's spelling is correct, not-so-nice sounds when it's wrong.

This program is friendly, too. It first displays all the words that will be in the program and lets the child study these for as long as he or she pleases. Once the child gets into the actual program, it remains friendly with aids.

The word definitions are slowly scrolled across the screen with attention-keeping clicks, and other prompts are announced with a tone.

Pressing the F1 key provides the child with clues. It gives aid one letter at a time, repeating clues after each spelling try, and also adding letters after each try, up to and including the total word.

And, of course, there's a reward for getting the word right—Casey Jones rolls along "on the right track" in his smoke-puffing and sound-chugging locomotive. The program reinforces the correct spelling with a final toot of the train whistle.

This continues until the child correctly spells all the words in the program's memory. The program then says goodbye with a hearty "Well done!" fol-

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By Gary Fields

In this program, your child's ability to learn words and their definitions isn't measured by points. Noises, clues and a smoke-puffing sprite train make learning fun.

lowed by a final review of the spelling words.

Providing the Words

The words are placed in the program by a parent or teacher. The program prompts the correct entry through a special "change WORDS/DEFINITIONS F2" routine (lines 80 and 155).

Words and definitions should be entered in even numbers because the data display is read in pairs. So, if you enter 11 words and definitions, add another to make an even 12. Also, the definitions should be less than 40 letters in length (try a longer one and you'll see why).

Our practice at home is to duplicate each week's spelling-lesson words into separate programs titled Speller 1, Speller 2 and so on. One disk is reserved just for spelling words. That way, the child can go back and try old lessons again. Or, if you're like us and have a younger child, the saved lessons may be for his or her future.

Descriptions of Lines

Line 15. Sets the screen color and switches to upper-/lowercase.

Line 20. Sets the basic sound and sprite-generating variables.

Line 25. Puts the data-reading pointer to the 0 in line 2950.

Lines 50–95. Title page.

Lines 80 and 155. Prompt for the word-replace routine.

Line 87. Reads and Pokes the train into memory.

Lines 100–165. Display the words this program will review.

Line 190. Makes the data pointer look at the first words.

Line 210. Reads the first word and definition; cc is the clue-variable counter.

Line 215. Looks to see if all the words have been used.

Lettering by Erick Ingraham / Airbrushing by Alden Thrasher

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Listing of the 64 Speller program.

```
5 REM *** THE 64 SPELLER ***
10 POKE53281,1:POKE5328Ø,1:PRINTCHR$(144);CHR$(14);CHR$
   (147)
15 CLR
2Ø S=54272:V=53248
25 RESTORE
49 REM *** TITLE ***
5Ø FORX=1TO6:PRINT:NEXTX
55 PRINTTAB(13)"{SHFT T}HE 64 {SHFT S}PELLER"
6Ø PRINT:PRINTTAB(13)"BY {SHFT G}ARY {SHFT F}IELDS"
7Ø PRINT:PRINT:PRINT:PRINT
75 PRINTCHR$(18)"{3 SPACEs}{SHFT N}{SHFT O}{SHFT T}{SHF
   T E} TO PARENT/TEACHER{15 SPACEs}"
8Ø PRINT:PRINTTAB(4)"{SHFT T}O CHANGE {SHFT W}{SHFT O}{
   SHFT R}{SHFT D}{SHFT S}/{SHFT D}{SHFT E}{SHFT F}{SHF
   T I}{SHFT N}{SHFT I}{SHFT T}{SHFT I}{SHFT O}{SHFT N}
   {SHFT S} - {SHFT F}1"
85 FORX=1TO4Ø:PRINTCHR$(183);:NEXTX:GOSUB2ØØØ
87 FOR PR=ØTO62:READPQ:POKE832+PR,PQ:NEXTPR
9Ø FOR X=1TO1ØØ
92 GETF1$:IFF1$=""THEN95
93 IFF1$=CHR$(133)THEN25ØØ
95 NEXTX
99 REM *** DISPLAY WORDS ***
1ØØ PRINTCHR$(147)
1Ø5 PRINT:PRINTCHR$(18)"{SHFT H}ERE ARE THE WORDS YOU W
    ILL BE SPELLING":PRINTCHR$(146)
11Ø READA1$
12Ø IFA1$="-1"THEN15Ø
125 READB1$,A2$,B2$
13Ø PRINTA1$:GOSUB2ØØØ
135 PRINTCHR$(145);TAB(2Ø)A2$:GOSUB2ØØØ
14Ø GOTO11Ø
15Ø PRINT:PRINTCHR$(18)" {SHFT P}{SHFT R}{SHFT E}{2 SHF
   T Ss} ANY KEY TO BEGIN{16 SPACEs}"
155 PRINT:PRINT:PRINTTAB(3)"{SHFT T}O CHANGE {SHFT W}{S
    HFT O}{SHFT R}{SHFT D}{SHFT S}/{SHFT D}{SHFT E}{SHF
    T F}{SHFT I}{SHFT N}{SHFT I}{SHFT T}{SHFT I}{SHFT O
    }{SHFT N}{SHFT S} - {SHFT F}1"
158 FORX=1TO4Ø:PRINTCHR$(183);:NEXTX:GOSUB2ØØØ
16Ø GETF1$:IFF1$=""THEN16Ø
165 IFF1$=CHR$(133)THEN25ØØ
19Ø RESTORE:FORPR=ØTO62:READPQ:NEXTPR
2ØØ PRINTCHR$(147)
21Ø READ A$,B$:CC=Ø
215 IF A$="-1"GOTO 15ØØ
219 REM *** DISPLAY OF B$ 22Ø-245
225 FORX=1TO6:PRINT:NEXTX
227 PRINT:PRINT
229 PRINT"{SHFT T}HIS DEFINES A WORD YOU KNOW."
23Ø FORX=1TO4Ø:PRINTCHR$(183);:NEXTX:PRINT:PRINT
232 FORI=ØTOLEN(B$)
235 POKES+24,6:POKES+1,126:POKES,6:POKES+5,12Ø:POKES+6,
    3Ø:POKES+4,33
24Ø PRINTLEFT$(B$,I+1):POKES+24,Ø
245 PRINTCHR$(145);CHR$(145):FORX=1TO4Ø:NEXTX
247 POKES+1,Ø:POKES,Ø:POKES+5,Ø:POKES+6,Ø:POKES+4,Ø:NEX
   TI
27Ø PRINT:PRINT:FORX=1TO1ØØ:NEXTX
28Ø INPUT"{SHFT C}AN YOU SPELL THE WORD";C$
29Ø FORX=1TO5Ø:NEXTX
3ØØ IFC$=A$GOTO6ØØ
31Ø IFC$<>A$GOTO8ØØ
599 REM *** WINNING ROUTINE ***
6ØØ PRINTCHR$(147):FORX=1TO9:PRINT:NEXTX
6Ø5 SM=24:REM *** START SMOKE LOCATION **
61Ø POKEV+4,2ØØ:POKEV+21,4:POKE2Ø42,13:POKEV+29,4:REM E
   XPAND & POSITION SPRITE
612 POKEV+41,Ø:REM MAKES TRAIN (SPRITE 2)BLACK
```

More

Lines 225–270. Slowly scroll the definition (b$) with clicks.

Line 280. Asks for the word defined.

Lines 300–310. Check the spelling and go to the correct or incorrect routine.

Lines 600–790. The correct spelling routine.

Line 610. Turns on the sprite and expands it.

Line 612. Makes sprite black.

Lines 622–624. Draw the tracks.

Line 625. Makes the train move from right to left.

Line 644. Chugging sound.

Line 645. Places the train in the correct starting location.

Line 646. The smoke variable is sm.

Line 651. Turns the chugging sound off.

Lines 657–661. The two train toots.

Line 662. Turns sprite off.

Lines 730–790. Make smoke come out of train's stack.

Lines 800–910. Incorrect spelling and clue routine.

Lines 810–840. Buzzer.

Lines 892–894. Check for clue request.

Line 895. Prints clue using LEFT$ command.

Line 910. Checks to see if new spelling is correct.

Lines 1500–1820. The win routine and sound.

Lines 1830–1890. Display the word list for the last time.

Lines 2000–2030. Beep tone sound.

Lines 2500–2900. Aid routine to replace data.

Lines 2950–2953. Train sprite data lines.

Lines 3000–4999. Replaceable data lines.

Line 5000. End of data line—never replace this line.

For those of you who don't want to type in this program, send me a cassette or formatted disk, along with a self-addressed, stamped mailer and $3 to cover copying, and I'll be glad to provide you with a copy. R

RUN It Right

Commodore 64

Address all author correspondence to Gary V. Fields, 86 Lanvale Ave., Asheville, NC 28806.

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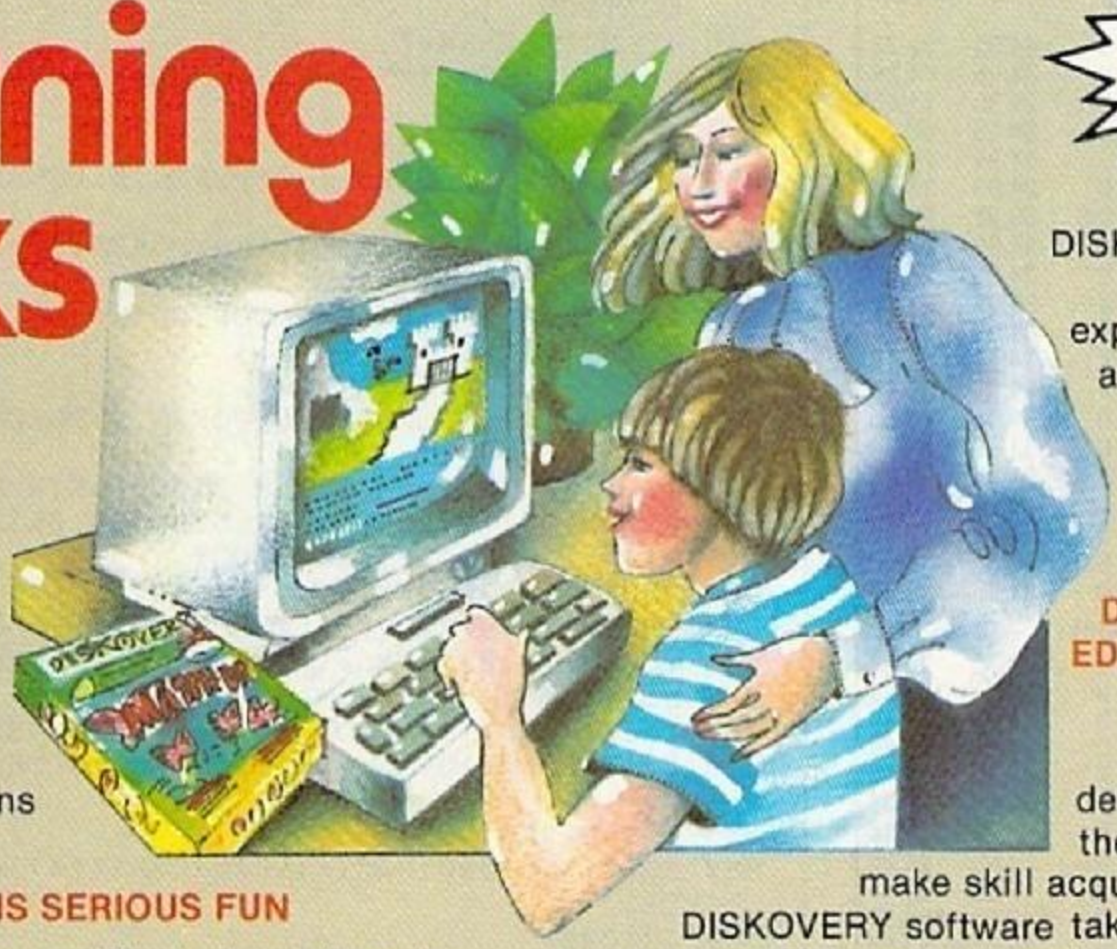

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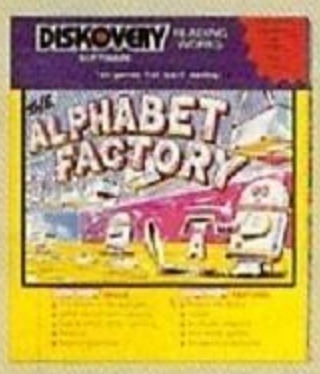

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- Adding facts
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- Counting
- Set separation
- Subtraction facts
- Math practice
- Number awareness
- ELECTRIC REPORT CARD (Print-out option)

(Disk & cassette for Commodore 64. Disk for Apple)

AGES 6 to 12 READING SKILLS

THE WORD BIRD helps children understand spatial relationships and the words that tell about them using bright, funny and exciting graphics.

- Vocabulary development
- Word order
- Sentence meaning
- Spatial words
- Reading

(Disks for Commodore 64)

TIME ZONE enhances abilities to see relationships between objects in space and events in time using colorful, humorous settings.

- Vocabulary development
- Word order
- Time words
- Sentence meaning
- Reading

(Disk for Commodore 64)

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Listing continued.

```
62Ø PRINT;A$:FORX=1TO2ØØ:NEXTX
622 PRINTCHR$(152);:FORX=1TO7:PRINTCHR$(178);:NEXTX
623 PRINT"{SHFT Y}OU'RE ON THE RIGHT TRACK";:FORX=1TO6:
    PRINTCHR$(178);:NEXTX
624 PRINTCHR$(144)
625 FORTN=2ØØTO24STEP-8:REM SPRITE MOVEMENT COUNTER
644 POKES+24,15:POKES+1,145:POKES,Ø:POKES+5,Ø:POKES+6,2
    4Ø:POKES+4,129
645 POKEV+4,TN:POKEV+5,12Ø:REM ** SPRITEMOVER X AND Y L
    OCATION
646 IFSM<1THENSM=1
647 SM=SM-1:REM *** MOVES SMOKE RIGHT TO LEFT
648 GOSUB75Ø
65Ø FORPU=1TO4Ø:NEXT PU
651 POKES+24,Ø:POKES+1,Ø:POKES,Ø:POKES+5,Ø:POKES+6,Ø:PO
    KES+4,Ø:NEXTTN
653 POKES+24,15:POKES+1,155:POKES,255:POKES+5,Ø:POKES+6
    ,24Ø:POKES+4,17:REM TOOT
655 PRINTCHR$(19):FORX=1TO6:PRINT:NEXTX:PRINTTAB(14)"{S
    HFT Y}OU GOT IT!!"
657 FORX=1TO5ØØ:NEXTX
658 POKES+24,Ø:POKES+1,Ø:POKES,Ø:POKES+5,Ø:POKES+6,Ø:PO
    KES+4,Ø
659 FORX=1TO3ØØ:NEXTX:REM PAUSE BETWEEN TOOTS
66Ø POKES+24,15:POKES+1,155:POKES,255:POKES+5,Ø:POKES+6
    ,24Ø:POKES+4,17:REM TOOT
661 FORX=1TO5ØØ:NEXTX
662 POKEV+21,Ø:REM *** TURNS SPRITE OFF
663 POKES+24,Ø:POKES+1,Ø:POKES,Ø:POKES+5,Ø:POKES+6,Ø:PO
    KES+4,Ø
664 PRINTCHR$(147):FORX=1TO6:PRINT:NEXTX
67Ø PRINTCHR$(18)A$;CHR$(146);" IS THE CORRECT SPELLING
    "
675 GOSUB2ØØØ
68Ø FORX=1TO1ØØØ:NEXTX:PRINTCHR$(147):FORX=1TO6:PRINT:N
    EXT
7ØØ GOTO2ØØ
73Ø REM **** SMOKE ROUTINE ***
75Ø PRINTCHR$(19);:FORX=1TO8:PRINT:NEXTX:REM MOVES SMOK
    E DOWN 6 LINES
76Ø PRINTTAB(SM);CHR$(31);CHR$(42);CHR$(32);CHR$(42):RE
    M PRINTS SMOKE
78Ø PRINTCHR$(144)
79Ø RETURN
799 REM *** INCORRECT ROUTINE ***
8ØØ PRINTCHR$(147)
8Ø1 FORX=1TO6:PRINT:NEXTX
8Ø2 PRINT"{SHFT Y}OUR ANSWER ";CHR$(18);C$;CHR$(146);"
    IS INCORRECT."
8Ø5 REM *** BUZZ SOUND ***
81Ø POKES+24,15:POKES+1,3:POKES,255:POKES+5,Ø:POKES+6,2
    4Ø:POKES+4,33
82Ø FORX=1TO6ØØ:NEXTX
825 POKES+24,15:POKES+1,34:POKES,75:POKES+5,128:POKES+6
    ,128:POKES+4,39
83Ø FORX=1TO6ØØ:NEXTX
84Ø POKES+24,Ø:POKES+1,Ø:POKES,Ø:POKES+5,Ø:POKES+6,Ø:PO
    KES+4,Ø
865 PRINT:PRINT"{SHFT T}RY AGAIN"
87Ø FORX=1TO8ØØ:NEXTX
88Ø PRINTCHR$(147):FORX=1TO6:PRINT:NEXTX
89Ø PRINTB$:PRINT:FORX=1TO5ØØ:NEXTX
892 PRINTCHR$(18);"{SHFT W}OULD YOU LIKE A CLUE? {SHFT
    P}RESS {SHFT F}1 "
893 GETCL$:IFCL$=""THEN893
894 IFCL$<>CHR$(133)THEN9ØØ
895 CC=CC+1:PRINT:PRINT:PRINTTAB(15);LEFT$(A$,CC):FORX=
    1TO5ØØ:NEXTX
896 PRINTCHR$(147):FORX=1TO6:PRINT:NEXTX
898 PRINTB$:PRINT:PRINT
```

More

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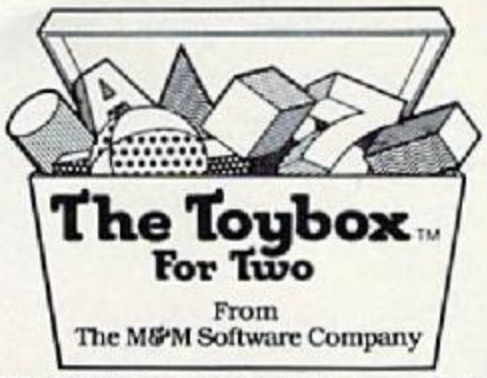
Listing continued.

```
9ØØ INPUT"{SHFT P}LEASE SPELL THE WORD ";C$
91Ø GOTO29Ø
1499 REM *** END ROUTINE ***
15ØØ FORX=1TO5ØØ:NEXT:C=Ø
151Ø PRINTCHR$(147):FORX=1TO6:PRINT:NEXTX
179Ø POKES+24,15:POKES+1,13Ø:POKES,Ø:POKES+5,9:POKES+6,
     24Ø:POKES+4,21
1795 PRINT"{SHFT G}{SHFT R}{SHFT E}{SHFT A}{SHFT T} YOU
      GOT THEM ALL {SHFT R}{SHFT I}{SHFT G}{SHFT H}{SHF
     T T}!!":C=C+1
1797 FORX=1TO6ØØ:NEXTX:PRINTCHR$(147)
18ØØ POKES+24,Ø:POKES+1,Ø:POKES,Ø:POKES+5,Ø:POKES+6,Ø:P
     OKES+4,Ø
181Ø FORX=1TO6:PRINT:NEXTX
182Ø IFC<4GOTO179Ø
183Ø PRINTCHR$(147):RESTORE:FORPR=ØTO62:READPQ:NEXTPR
184Ø PRINTCHR$(18)" {SHFT H}ERE ARE YOUR SPELLING WORDS
      AGAIN. "
185Ø READA1$
1855 IFA1$="-1"THENEND
186Ø READB1$,A2$,B2$
188Ø PRINTA1$;:PRINTTAB(2Ø)A2$
189Ø GOTO185Ø
1999 REM **** BEEP SOUND ****
2ØØØ POKES+24,15:POKES+1,45:POKES,Ø:POKES+5,9:POKES+6,Ø
     :POKES+4,17
2Ø1Ø FORX=1TO4ØØ:NEXTX
2Ø2Ø POKES+24,Ø:POKES+1,Ø:POKES,Ø:POKES+5,Ø:POKES+6,Ø:P
     OKES+4,Ø
2Ø3Ø RETURN
2499 REM **** ADD DATA ROUTINE ***
25ØØ PRINTCHR$(147)
251Ø PRINT:PRINT:PRINT
252Ø PRINT"{SHFT W}ORDS AND DEFINITIONS ARE STORED IN{5
      SPACEs}{SHFT D}ATA LINES"
2525 PRINT"{SHFT T}HESE ARE LINES 2999-4999"
253Ø PRINT:PRINT"{SHFT W}HEN REPLACING, BE SURE TO ENTE
     R:"
254Ø PRINT:PRINT" {SHFT D}{SHFT A}{SHFT T}{SHFT A} LINE
      FOLLOWED BY 'DATA'"
2545 PRINT" THEN THE {SHFT W}{SHFT O}{SHFT R}{SHFT D} F
     OLLOWED BY COMMA"
255Ø PRINT" THEN THE {SHFT D}{SHFT E}{SHFT F}{SHFT I}{S
     HFT N}{SHFT I}{SHFT T}{SHFT I}{SHFT O}{SHFT N} NO
     COMMA"
2555 PRINT:PRINT"{SHFT R}EMEMBER- THE DEFINITON CAN NOT
      BE OVER 39 CHARACTERS LONG"
26ØØ PRINT:PRINTCHR$(18)"{SHFT P}RESS {SHFT R}ETURN TO
     LIST DATA LINES";:INPUTF2$
29ØØ LIST2999-4999
295Ø DATAØ,Ø,Ø,25,191,255,31,191,255,31,156,6,15,12,244
     , 15
2951 DATA45,244,95,252,18Ø,127,252,116,255,252,52,255,2
     55,252,127, 255
2952 DATA254,95,255,255,3,255,255,3,255,255,15,254,Ø,31
     ,252, 254
2953 DATA63,253,131,12Ø,61,57,243,157,57,246,193,131,3,
     128,254
2999 REM *** DATA LINES ***
3ØØØ DATA "DOG","{SHFT A} FOUR LEGGED PET THAT BARKS"
3ØØ2 DATA "PENCIL","{SHFT Y}OU USE IT TO WRITE AT SCHOO
     L"
3ØØ4 DATA "ELEPHANT","{SHFT T}HE BIGGEST ANIMAL ON LAND
     "
3ØØ6 DATA "ALPHABET","{SHFT W}HAT ALL THE A,B,C'S ARE C
     ALLED"
3Ø24 DATA "MORNING","{SHFT T}IME OF DAY WHEN YOU FIRST
     WAKE UP"
3Ø28 DATA "FRIEND","{SHFT S}OMEONE YOU LIKE VERY MUCH"
5ØØØ DATA "-1","-1","-1","-1"
```

Circle 173 on Reader Service card.



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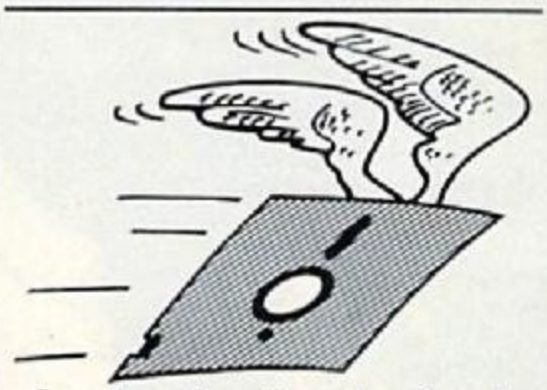

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WATCH YOUR SIDESTEP!

By Fran O'Gorman

In Sidestep, you use a joystick (in port 2) to lead an imaginary man from the upper left corner of the screen, through a maze, to the lower right corner. As you do this, the man leaves a trail of footsteps and produces the sound of footsteps. If you lead the man into a wall or cause him to retrace his steps, the game ends, and your score is determined by how many successful footsteps or meters you made before this.

If you are able to lead your man completely

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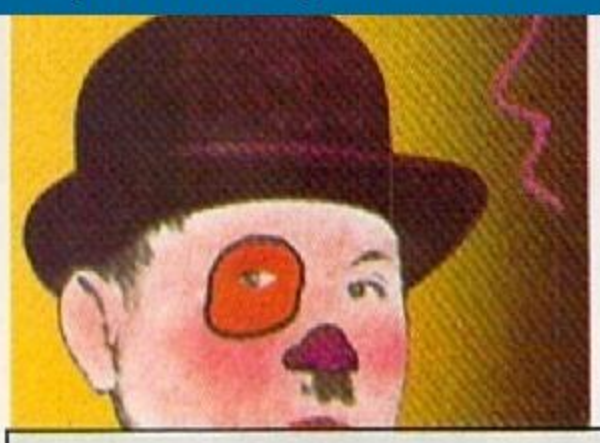
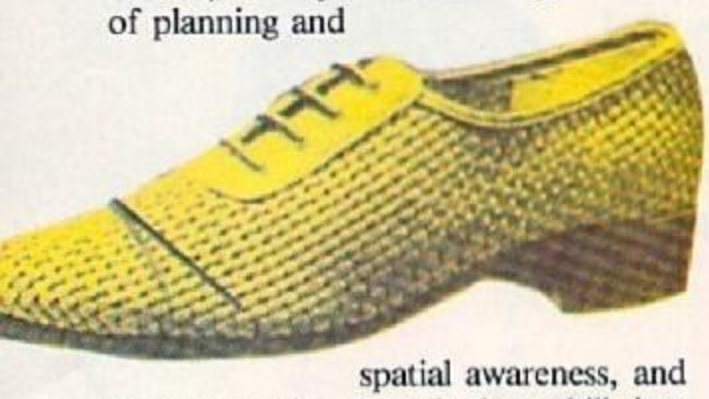


through the maze, you receive a much higher score, which is multiplied by how many steps you needed to reach that goal. You're also rewarded for succeeding if the randomly-designed maze was particularly difficult or if you chose a more difficult path and still succeeded.

When the game ends, you may begin again by pushing the joystick button.

More Than a Game

While just about anyone would enjoy Sidestep, I feel it would be particularly useful to a young child. It involves a certain degree of problem solving, in terms of planning and



spatial awareness, and an opportunity to apply these skills in a fun but unhurried manner.

I did not include a time factor, and I allowed a certain amount of points for the player who is unable to lead the man's footsteps to the goal (which is indicated by a question mark).

Should the mazes prove either too difficult or too easy, adjust the number 20 in line 11. If, for instance, you increased this number to 30, the game would be more difficult, while if you decreased the number to 10, the game would be easier.

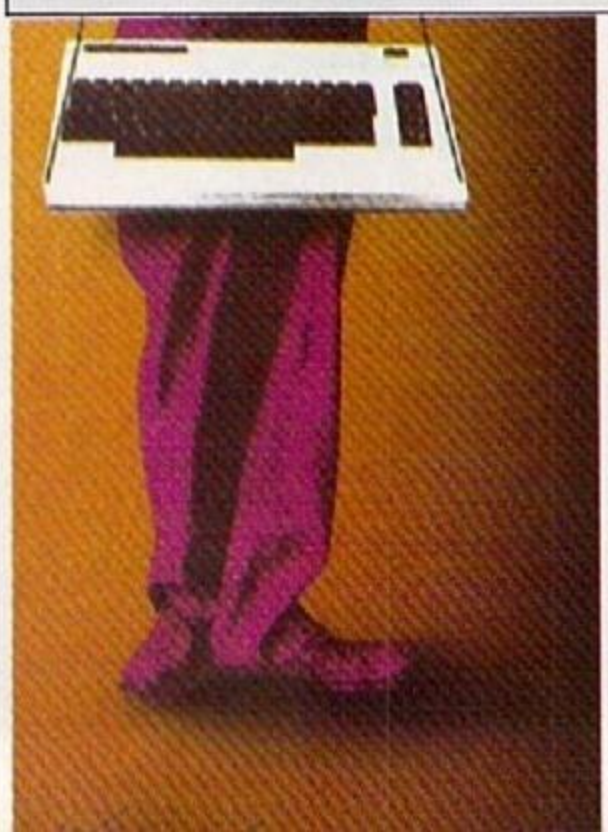
Visual left-to-right tracking and an ability to visually "take in" a total screen, or page, are skills sought on the pre-reading level, so this game may have some educational value. Otherwise, you can view it as an undemanding exercise of eye-hand coordination, which can be of value at any age.

RUN It Right

Commodore 64
Joystick

Listing of the Sidestep program for the C-64.

```
2 REM SIDE STEP
1Ø P=11Ø4:G=54272:FORI=ØTO1Ø:READA(I):NEXT:PRINT"{SHFT
   CLR}":POKE5328Ø,9:POKE53281,7
11 DEFFNA(X)=INT(11Ø8+(1922-11Ø8+1)*RND(1)):FORT=1TO2Ø
12 FORL=FNA(X)TOL+1ØØSTEP4Ø:POKEL,16Ø:POKEL+G,2:NEXTL
13 FORM=FNA(X)TOM+5:POKEM,16Ø:POKEM+G,2:NEXTM:NEXTT
14 POKE2Ø23,191:POKEG+2Ø23,Ø:PRINT"{HOME}{CTRL 1}START"
15 DATAØ,-4Ø,4Ø,,-1,-41,39,,1,-39,41
16 FORI=ØTO1Ø:READB(I):NEXT
2Ø DATA32,117,118,,121,124,126,,121,123,126
25 FORI=ØTO1Ø:READC(I):NEXT
3Ø DATA32,118,117,,12Ø,126,123,,12Ø,126,123
4Ø GOSUB1ØØ
7Ø S=B(V):POKEP,S:POKEP+G,Ø:GOSUB9ØØ:GOSUB1ØØ
8Ø S=C(V):POKEP,S:POKEP+G,Ø:GOSUB9ØØ
9Ø GOTO4Ø
1ØØ V=15-(PEEK(5632Ø)AND15):IFV=ØTHEN1ØØ
1Ø5 P=P+A(V):GOSUB8ØØ
11Ø IFP<1Ø64THENP=P-A(V):WAITP,B(V)
12Ø IFP>2Ø23THENP=P-A(V):WAITP,B(V)
13Ø RETURN
8ØØ C=C+1:PRINT"{HOME}{CTRL 1}SCORE="C" METERS"
81Ø IFPEEK(P)=16ØORPEEK(P)=117ORPEEK(P)=118ORPEEK(P)=12
   ØORPEEK(P)=123THEN815
811 IFPEEK(P)=126THENGOTO815
812 IFP=2Ø23THENGOTO94Ø
813 RETURN
815 PRINT"{SHFT CLR}"TAB(92)"YOUR TOTAL="CTAB(92)"PUSH
   JOY BUTTON FOR MORE"
818 IF(PEEK(5632Ø)AND16)<>ØTHEN818
82Ø CLR:GOTO1Ø
9ØØ POKE54296,15:POKE54277,33:POKE54278,17
91Ø POKE54276,129:POKE54273,28:POKE54272,49
92Ø POKE54276,Ø:POKE54273,Ø:POKE54272,Ø
93Ø RETURN
94Ø C=C*1ØØ
945 PRINT"{SHFT CLR}"TAB(87)"YOU MADE IT! YOUR TOTAL="C
   TAB(87)"PUSH JOY BUTTON FOR MORE"
95Ø GOTO818
```



I came up with the idea for this program partly from working with first graders, with the Logo screen turtle, and partly from my seven-year-old neighbor who used to joke about this "little man" in the computer.

The computer, as a means of perception, along with a model, whether it be a turtle or a little man with which the child can identify, can provide a useful learning environment and a lot of fun. R

Address all author correspondence to Fran O'Gorman, 3 Laroc Road, Chester, NY 10918.

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MYSTERIES Of The WEDGE REVEALED

The wedge need no longer be an enigma. This article provides a complete, accurate description of the wedge and all its functions, and includes a simple method for copying the wedge to other disks. *BY LOUIS F. SANDER*

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The DOS support program, also called the wedge, is one of the Commodore 64's most useful programs. Unfortunately, it has no official documentation, and the unofficial documentation is often incomplete or inaccurate. This article attempts to provide a complete, accurate description of the wedge and all its functions, and includes a simple method for copying the wedge to other disks.

The VIC-20 has a similar but less powerful wedge, whose functions are not covered here. VIC users might try some of our simpler ideas, just to see if they work on their own machines.

To understand the wedge, you must first be familiar with the elementary operations of the 1541 disk drive, and our explanations will assume you have that familiarity. We'll assume that you can load and save Basic programs using the disk drive, and that you can load and read a disk directory. If you can't do those simple things, you'll have to study your manual, or better yet, read "Mystery of the Black Box Revealed" (*RUN*, February 1984).

Understanding the Programs

The wedge is really *two* programs—a machine language program that "does the work," and a Basic program that loads and executes the machine language. To look at the two programs, get out the Test/Demo disk that came with your 1541 disk drive, then load and list its directory. You'll see a program named DOS 5.1, the wedge's all-important machine language program.

You'll also see a program named C-64 Wedge, which is the so-called Basic loader. Right now, load C-64 Wedge so you can look at it. The easiest way of loading this (or any program) is by typing LOAD over the number that appears before the program name on the directory listing. Then put your cursor somewhere between the program name and the word PRG, and type a comma, an 8 and a colon. Press the return key and C-64 Wedge will load. When you see the Ready prompt, clear your screen and list the program. Not much to it, is there? Let's take a look at how it works.

The first line sets A=1 and loads DOS 5.1. Notice that the Load command is of the ,8,1 form, which is always used to load machine language programs from disk. When a Load procedure is performed from within a program, as in this case, the new program is loaded, then the Basic program in memory automatically begins execution. Interestingly, the variables from the old Basic program are *not* reset to 0 by this operation.

The VIC-20 has a similar but less powerful wedge, whose functions are not covered here. VIC-20 users might try some of our simpler ideas, just to see if they work.

Since you are dealing with machine language here, the Basic program that will be run after you've loaded the program is the only one in memory—your old friend C-64 Wedge! This time through, A=1, because it was set to that value the *first* time through. Since A=1, line 10 will be bypassed in favor of line 20.

The SYS command in line 20 will cause DOS 5.1 to be executed, and the New command in line 30 will cause C-64 Wedge to be erased.

Now that you've examined C-64 Wedge, it's time to run it and let it do its work. Run it now, and keep your eyes on the screen. When DOS 5.1 is executed, you'll see its self-descriptive welcome message. The DOS version used in writing this article identifies itself as V5.1/071382. If you have another version, I can't guarantee that it will work the same as this one, but it will probably be close.

DOS 5.1 loads into an area of memory that is never used by Basic, but which is often used by other machine language programs. Also, the wedge's way of detecting its own special keystrokes is often used by other machine language programs, and that's a completely independent source of conflict.

There's a good chance, then, that your other ML programs will interfere with the wedge when they are loaded or executed. ML experts know all about this phenomenon, but others can be mystified when the wedge commands inexplicably cease to function. Interference with other ML programs is usually the reason. But right now, there *is* no other machine language in memory, so DOS 5.1, the wedge, is ready to do its job.

Using the Wedge Commands

The wedge's main function is to reduce the number of keystrokes required for routine disk operations, but it has some other nice features as well. Once it is in memory, you use most of its features by typing > or @, then perhaps a few more characters, then hitting the return key. Since the @ doesn't require shifting, that's the character we'll use in our further descriptions.

The simplest wedge command is the @ key, followed by a return. This reads the disk error channel and displays the results on the screen. Try it right now—you should get the following four-part message.

```
00, OK,00,00
```

The first part, 00 in this case, is the disk error code. If there's no error, the code of course is zero. The second part, OK, is the verbal description associated with whatever error code exists. The third and fourth parts are the track and sector on which the error, if any, was found.

You will want to read the error channel whenever your drive's red light is blinking—typing @ and hitting the return key will show you exactly what is wrong. It will also put out the light. Try

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loading a nonexistent program, and you'll see what we mean.

Another simple wedge command is @$ along with the return key; this lists the disk directory to the screen, *without* overwriting any Basic program in memory. You can test the functioning of this feature by entering a simple Basic program and then using @$ to view the directory.

The @$ command has even more to recommend it—you can freeze the directory listing at any time by hitting the space bar and resume by hitting the space bar again. Nice, eh? Be careful not to press the space bar for more than an instant, since its repeating action will keep defeating the freeze.

You can selectively search the directory by adding a colon and a program name after the dollar sign. To see if your disk holds a program named Bill, enter @$:BILL. To see all the programs beginning with B, enter @$:B*. To see all the programs whose first and fourth letters are B and L, enter @$:B??L*.

There's room for artistry in the use of any tool; the wedge is no exception.

You can selectively search for files of a certain type by appending =x to your search specifications, where x is the first letter of the file type. For example, @$=P will display all the program files; @$:KATHY*=S will display all the sequential files whose names start with Kathy; and @$BILL*=R will display the relative files whose names start with Bill. All the selective search methods mentioned here are functions of the 1541 rather than the wedge—you can use them with LOAD"$" just as easily as with @$.

Some important wedge commands make it easy to save, load and run programs on the disk. The slash key (/), followed by a program name, will load a Basic program. It doesn't matter whether the program name is enclosed in quotes, and this command also honors the wild card and pattern-matching characters. Quotes can be used in handling program names that have leading spaces or other unusual characters.

In identical fashion, the up arrow key will load *and run* a Basic program, and the percent key will load a machine language program into its proper place. After using the percent key, there is no need to use the New command as with other ML loading methods.

The left arrow key will *save* a Basic program, but the * and ? characters are, of course, illegal in program names.

Other wedge commands can be used to scratch, rename, or copy program or data files, and to format new disks or to erase old ones. These commands, and other less useful ones, are listed in Table 1. If you are familiar with the wedge, you'll see that these commands lack the 0s usually found in similar tables. The explanation appears in note 5 to Table 1.

If you don't understand some commands in Table 1, consult your disk drive manual, or speak with a friend who's expert in disk drive matters. Every command has a useful purpose, though sometimes it's rather obscure.

The Copy command is one of these, and demonstrating one of its more interesting uses will also give you some practice in using the wedge. Sometimes you'd like to have a certain program appear as the first one in the directory, perhaps to make it easy to find. You can use the wedge and the Copy command to move any program to the first directory position. Here's how to do it:

1. Find a disk containing a program you want to move to the first directory position.

```
10 REM{5 SPACEs}LOUIS F. SANDER 04/09/84
12 REM
14 REM THIS PROGRAM, WHOSE NAME IS
16 REM
18 REM{8 SPACEs}"C-64 WEDGE",
20 REM
22 REM IS A BASIC LOADER FOR A ML
24 REM 'WEDGE' PROGRAM WHOSE NAME IS
26 REM
28 REM{9 SPACEs}"DOS 5.1".
30 REM
32 REM TO COPY THIS PROGRAM AND THE
34 REM WEDGE TO ANOTHER DISK, JUST RUN
36 REM THIS ONE AND IMMEDIATELY DEPRESS
38 REM THE 'S' KEY. ('S' IS FOR 'SAVE')
40 REM KEEP IT DEPRESSED UNTIL FURTHER
42 REM DIRECTIONS APPEAR ON THE SCREEN.
44 REM
46 REM IF YOU RENAME THIS PROGRAM OR
48 REM THE WEDGE PROGRAM ITSELF, BE
50 REM SURE TO PUT THE NEW NAMES INTO
52 REM LINES 18, 28, 100, 170 AND 180.
54 REM
100 IFA=0THENA=1:LOAD"DOS 5.1",8,1
110 IFPEEK(197)=13THEN140
120 IFA=1THENSYS52224
130 NEW
140 PRINT"{CRSR DN}TO PUT THE WEDGE PROGRAMS ONTO A DIS
    K,"
150 PRINT"{CRSR DN}INSERT THE DISK, THEN PRESS 'D'..."
160 GETA$:IFA$<>"D"THEN160
170 SAVE"C-64 WEDCE",8
180 POKE43,0:POKE44,204:POKE45,90:POKE46,207:SAVE"DOS 5
    .1",8,1:SYS64738
```

Listing of the C-64 Wedge program.

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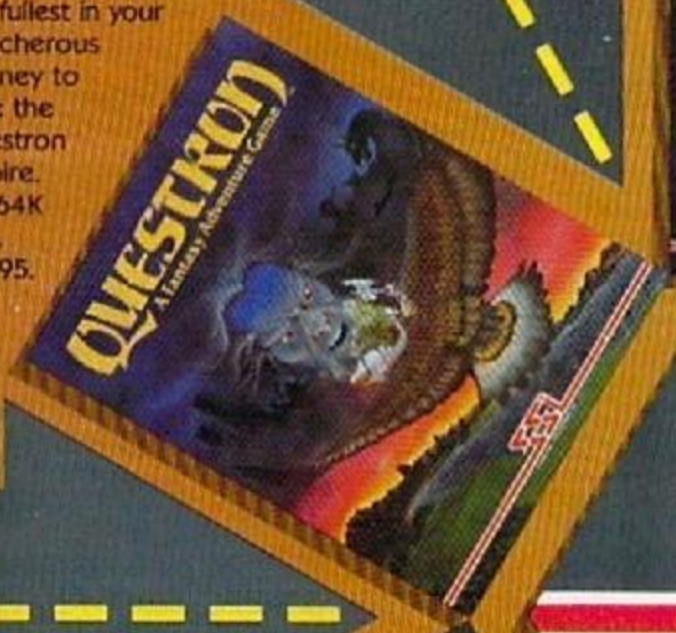

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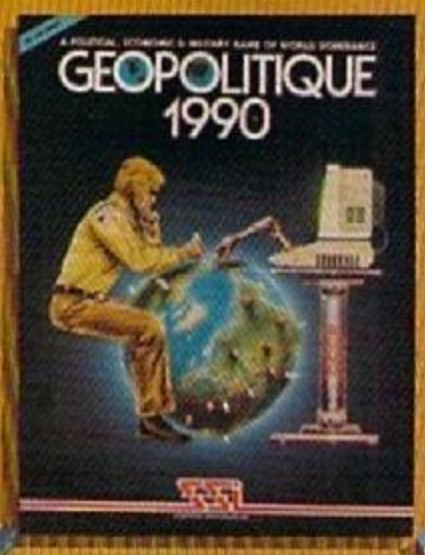

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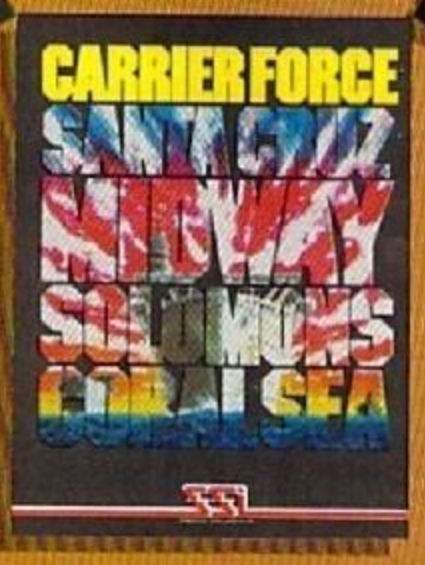

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2. Using the wedge, rename the program that is *now* in the first position. Make the new name something memorable, like OLDFIRST, and remember its former name. Use this:

@R:OLDFIRST = formername

3. Copy OLDFIRST, giving it back its former name, like this:

@C:formername = OLDFIRST

There are now two copies of that program on the disk, named formername and OLDFIRST. OLDFIRST is in the first directory position.

4. Scratch OLDFIRST, using

@S:OLDFIRST

5. Similarly rename the program you want in first position, calling it NEWFIRST, while remembering its previous name.

@R:NEWFIRST = previousname

6. Copy NEWFIRST, giving it back its previous name, by entering:

@C:previousname = NEWFIRST

7. Check the directory and confirm that previousname now occupies the first position.

8. Scratch NEWFIRST by entering:

@S:NEWFIRST

You've now accomplished a previously impossible task, and you're starting to learn to use the wedge. By now, you should also be feeling a sense of accomplishment—enjoy it!

COPY A FILE	@C:newname = oldname
DIRECTORY	@$
SELECTIVE DIRECTORY	@$:filename
ERASE DIRECTORY FROM DISK	@N:diskname
FORMAT A DISK	@N:diskname,ID
INITIALIZE DISK DRIVE	@I
LOAD A BASIC PROGRAM	/filename
LOAD & RUN A BASIC PROGRAM	↑filename
LOAD MACHINE LANGUAGE PROGRAM	%filename
QUIT THE WEDGE PROGRAM	@Q
RENAME A FILE	@R:newname = oldname
SAVE A BASIC PROGRAM TO DISK	←filename
SAVE WITH REPLACE (Dangerous!)	←@:filename
SCRATCH A FILE	@S:filename
SET ACTIVE DEVICE NUMBER	@#n
SPEED CHANGE—C-64 SPEED	@UI+
SPEED CHANGE—VIC-20 SPEED	@UI-
VALIDATE DISK	@V

Table 1. DOS 5.1 wedge commands.

Notes to Table 1.

1. In using the wedge, the > symbol may always be substituted for the @ symbol.

2. This table uses FILE to refer to anything recorded on disk, whether it is a program or any type of data file. Similarly, filename indicates the name of a program *or* data file.

3. In general, the pattern-matching (*) and wild-card (?) characters can be used in reading filenames, but not in writing them.

4. Generally, the material following the @ or other special symbol may be enclosed within quotes if desired. The quotes can be helpful when filenames include leading spaces or other unusual characters. The opening quote must be the first non-space character after the special symbol.

5. If you desire, 0 or 1 can be inserted just before any colon, to indicate the drive number in a multi-drive disk unit. Drive numbers are never necessary with the 1541 disk unit.

6. Use of the Save With Replace function is not recommended, since it occasionally corrupts a disk.

On Becoming a True Wedge Master

There's room for artistry in the use of any tool, and the wedge is no exception. Once you know the basics of wedgework, the material in this section will help you in your journey towards artistry.

You can load or load and run programs by using one of the @$ forms to list the disk directory, moving the cursor up to the desired program's name and replacing the number-of-blocks digit(s) with a single slash, up arrow or percent sign. As long as there's nothing else between that symbol and the first set of quotes on the program name, you don't have to worry about extra spaces or the PRG—the wedge will ignore them.

You can scratch programs in a similar way, but you must put the @ outside the first quotation mark in the directory entry, and the S: *inside* it. The insert key makes this easy to do.

Using the above format, but substituting the appropriate letter for the S, you can rename or copy programs or data files.

You can often use your computer while the disk is executing a lengthy command. If the cursor is blinking, your keyboard is active, and you can use the computer at will. You can even type in another disk command, which the 1541 will execute as soon as it is free. If you do this, your keyboard will be inactive until the execution of the second command has begun.

If you have a reset button on your computer, using it disables your wedge, even though DOS 5.1 is still in memory. You can resurrect the wedge by entering:

```
SYS 52224
@#8
```

The second line sets the active device number to 8 (or 9, if you call for it).

You need not use the Basic loader program at all. The same thing can be accomplished by executing the following three lines in Direct mode.

```
LOAD"DOS 5.1",8,1
NEW
SYS 52224
```

This takes more keystrokes than using the Basic loader, but it is faster and

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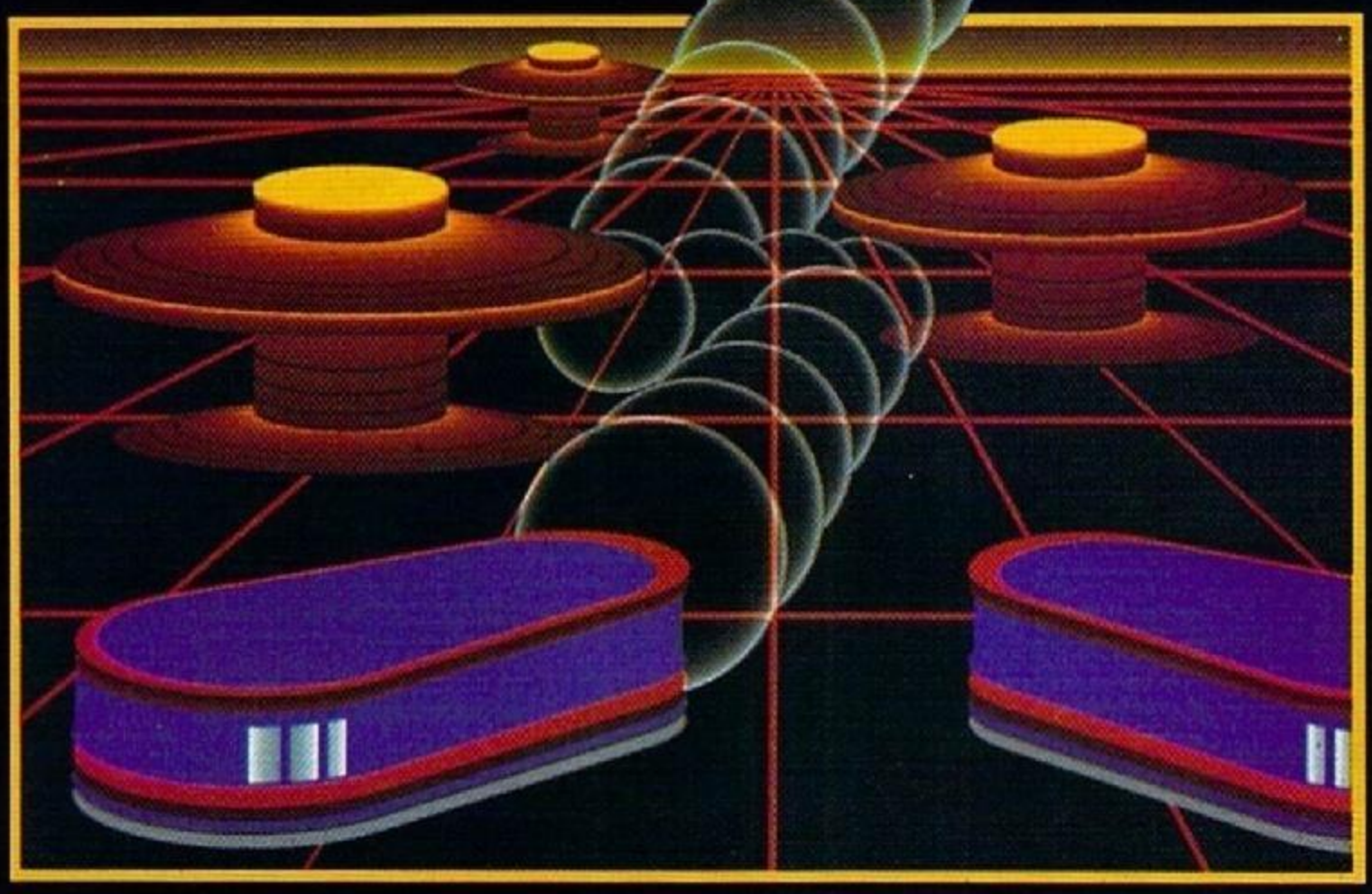

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avoids overwriting whatever Basic program is already in memory. You can use an UNNEW program to resurrect that program after the New command. It's very useful, when you need it.

You can easily change C-64 Wedge to make it simpler to use or understand. One is to substitute the number 52224 for the long expression in the second line. Another is to give it a name that makes it easy to load. I'm partial to the name "!" since it requires a minimum of fingerwork when loading the Basic loader.

The wedge's welcome message is easy to change, just by Poking a new message in its place. The message is stored from $CC7B–$CCDC (52347–52444 decimal), and if you replace it, Poke a 0 after the last character you want to print. Preexisting characters after your 0 will be ignored when the message is printed.

The Quit Wedge command is useful when special characters used with other programs interfere with the special control characters of the wedge. When you use it, the wedge stays in memory, but its commands no longer function. You can reenable the wedge as previously described.

You set the active device number when you have two 1541s, or when your drive is device 9 rather than device 8. Set the active device to 9, and the wedge will be in control of that device, rather than the default device 8. If you set the device to 1, you can use the wedge to load and save programs with your Datassette.

Saving the Wedge to Other Disks

I've saved the best until last. Now that you're a wedge master, you'll want to have copies of both programs on every disk you own. If you replace C-64 Wedge with the program in the accompanying listing, you can do it at the touch of a button. Since the program necessarily erases itself when run, be sure to save it before you test it. Line 180 is the important line, and must be entered without errors, or the program will not work properly.

The REM statements in lines 10–54 explain the program in some detail. You can leave them out if you'd like, at the risk of forgetting what to do with the program. (You *could* convert them to Print statements!) Whether you keep the REM statements or not, the meat of the program is in the nine lines from 100 upward. They work so well, they're almost like magic. R

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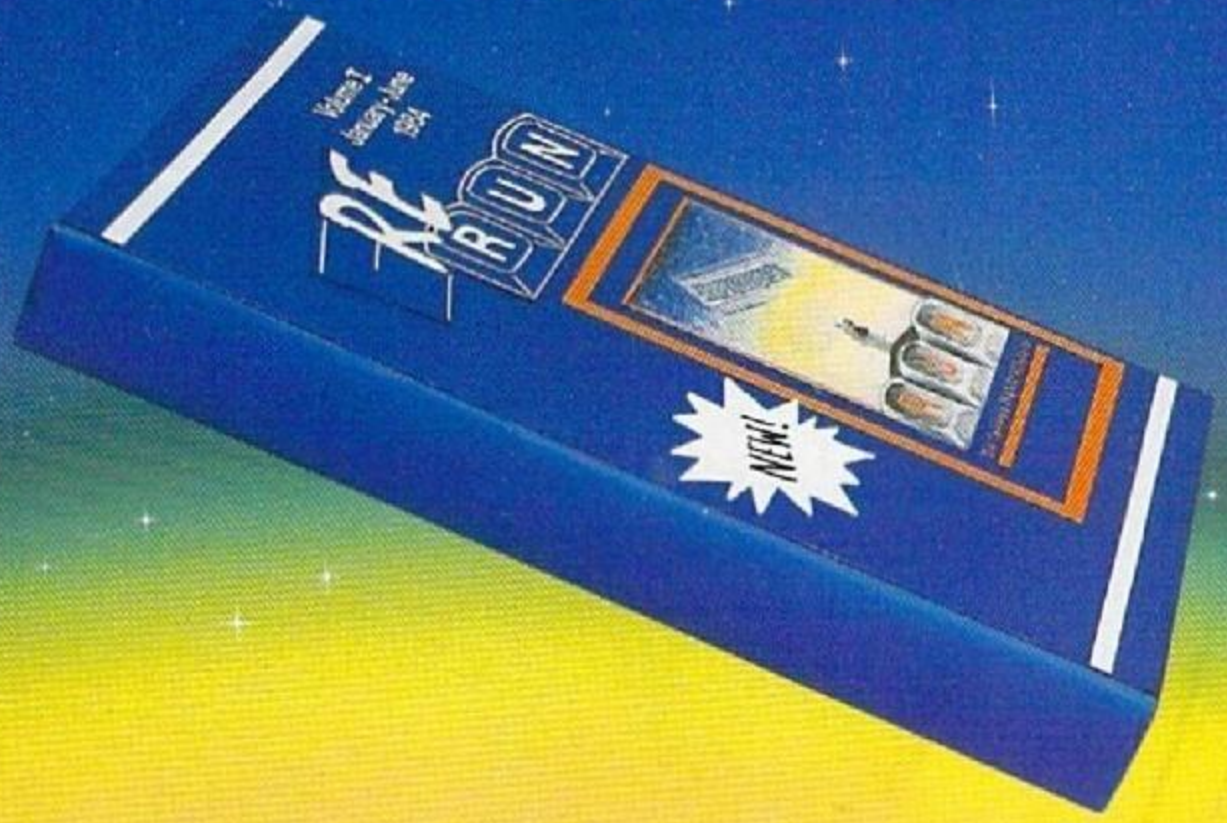

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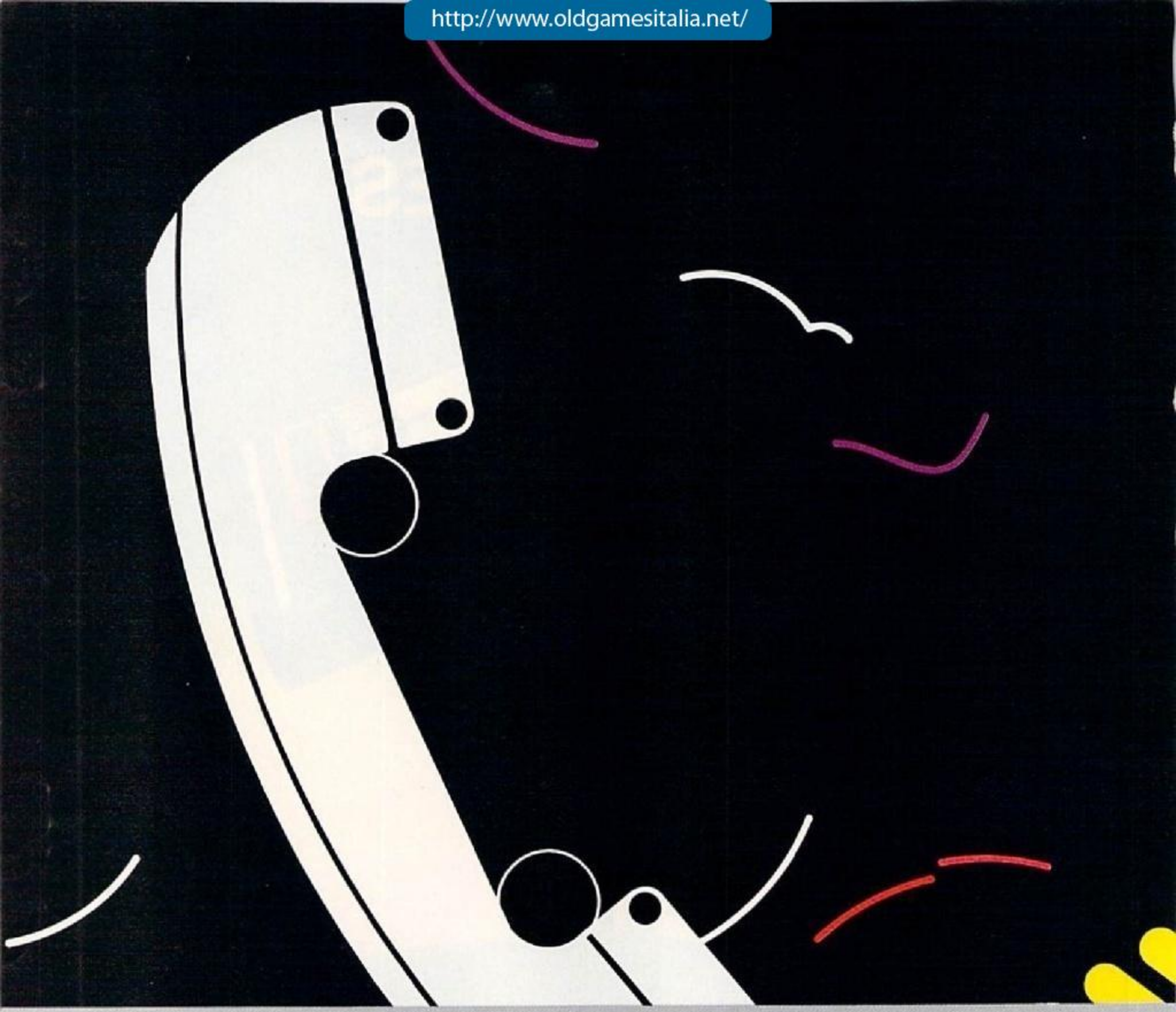

TERMINAL PROGRAMS

Seven of the Best Ones Reviewed

BY JIM STRASMA

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Illustration by Philip Geraci

A communications, or terminal, program allows your home computer to pass messages back and forth to another computer. It works like a telephone switchboard, connecting two distant pieces of equipment. Once connected to another computer, either directly through a cable or through a telephone interface called a modem (for *mo*dulator-*dem*odulator), your computer can do many of the same things with the remote computer that you could do if you were sitting in front of it.

Your VIC or 64 can talk to mainframe computers anywhere in the world and run programs too large to fit in a microcomputer. Commodore's 1650 and 1600 modems plug into the user port on the left rear of the VIC or 64. Other modems use Com-

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modore's 1011-A RS-232 interface to connect to the same port. A terminal program then picks up the information from the port and translates it into a form the VIC or 64 can understand.

With a suitable program, the VIC or 64 can also save a copy of what you receive, and turn it into a form you can use after you halt the terminal program. This saves you from taking notes while connected, or while you're on-line.

You can also use the computer's intelligence to send to the remote system things that were prepared in advance (while you were off-line). This cuts telephone charges by reducing the time the remote system spends waiting for you to do something.

What kind of information is available through a communications program? You can dial the latest stock reports, fast-breaking news, movie reviews, farm market reports or weather reports. You can even get airline schedules and shop by catalog. Commercial services provide articles from the *World Book Encyclopedia*, the *New York Times*, medical and scientific journals, the Bible, the New York Public Library's card catalog and congressional legislation.

Most of these "information utilities" charge a membership fee, plus an hourly fee for use and sometimes a monthly minimum fee (in addition to your telephone bill). The two most popular ones are CompuServe and The Source. They, in turn, often use a telephone network supplied by Tymnet, Telenet or Uninet to make your connection a local call in many large cities.

Some people just want to talk to other computer users, and transfer information between brands of computers. One way to do this is with electronic mail, which sends a computer message to someone in the same computer system or via Western Union's Mailgram service.

Many computer user's groups have set up free electronic bulletin board systems (BBSs) across the country. With a simple terminal program and your modem, you can send messages from your computer to the "host" computer that serves as the bulletin board. You can chat with the system's operator (known as the SYSOP) or leave a message or question for others to read. When you check back, you might find a reply.

Some bulletin board systems, when paired with a compatible terminal program, can even transfer computer programs between computers (this is known as *uploading* and *downloading*).

What to Look For

Although there is a well-established electronic standard guiding the way terminals communicate, many variables within it can cause problems. These include: word length, parity, stop bits, duplex, character sets and control characters. These must be set by a terminal program. Within limits, the settings don't matter, as long as both ends of the wire use the same ones.

When transmitting messages over a modem, an alphabetic character set known as ASCII (American Standard Code for Information Interchange) is commonly used. The VIC and 64 use a variation of ASCII, often called PETSCII. Terminal programs convert this into true ASCII when talking to non-Commodore equipment.

Since phone systems are not completely reliable, you will occasionally receive a faulty character. To avoid problems resulting from this, various protocols, or sets of rules, have been developed. At the moment, there are two very popular protocols for the VIC and 64.

One was designed by Steve Punter, and is used by the many PET BBSs. The other, designed by CompuServe, is used in its "image" (abbreviated .img) files.

Since CompuServe features Commodore's Information Network, a project of Commodore U.S., to help owners of Commodore-brand computers, those of you who use a modem regularly may want to join CompuServe and participate in the network. Membership is free with purchase of a Commodore modem, and there is no minimum monthly fee.

Communicating with Other Computers

One of the most intriguing aspects of computers is that they can be made to communicate with each other directly, despite their brand. Once accomplished, a whole new world of information is opened up to you.

Modems can use either of two carrier tones—one high and one low—in establishing a communication link. Having two tones allows computers at both ends to send data at once, just as both people in a phone conversation can talk at once.

Switches labeled "originate" and "answer" select which tone to use. According to the standard that Commodore modems follow, the computer making the phone call is set to "originate," and the computer answering the phone is set to "answer."

In practice, this means most calls will probably be in Originate mode, since you are generally calling other computers. Whichever modem is set to answer will emit a continuous tone audible over any phone connected to the line. The originate modem will remain quiet until it detects this tone, then respond with its own tone.

At this point, communication is established, and suitable programs can begin to transfer information between the computers. The computers involved may be as different as day and night, as long as they follow the nearly-universal standard, known as Bell 103.

Another switch found on most modems is for what is known as duplex, usually labeled "half" and "full." When calling bulletin boards and large computers such as CompuServe, you'll usually use full duplex. This means that information you send to the other computer is immediately copied and sent back (echoed) to you. This enables you to know whether or not the other computer received your intended information.

However, most small computers don't provide echo back. In these cases, your modem can do so itself. This doesn't test the reliability of your transmission, but it at least allows you to see what you type. A typical instance when half duplex is needed is when you are communicating directly with a friend's home computer.

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In practice, begin each conversation with a new computer in full duplex. Then, if the program you are using doesn't display anything as you type, switch to half duplex. On the other hand, if you start out in half duplex, and each character is repeated twice (i.e., hheellllloo), then switch to full duplex.

Levels of Terminal Programs

Terminal programs are based on actual machines, also known as terminals because they operate as terminal (end) points in a communications network.

At its simplest, a traditional terminal simply receives information from a remote source and copies it onto a display screen or paper, scrolling it up from one end of the screen or paper to the other and off, just as printouts roll up and out of a Teletype machine. Newer terminals have cursor controls similar to those of the 64, to allow received information to appear at a specific place on the display.

However, most terminals are not actually computers and cannot save the information they receive, in which case they are known as "dumb terminals."

The best new terminals are actually microcomputers in their own right, including a disk drive and printer to save and print received information and to prepare information to be sent before communication is actually established with the main computer. Nearly all the terminal programs sold commercially for the VIC and 64 are of this last variety—intelligent terminals that take advantage of the disk and printer.

Some go even further, emulating specific popular terminals such as Digital Equipment's VT-52. This allows a student, for example, to use a 64 on a campus computer system that expects all its terminals to be VT-52s.

One problem with terminal programs on the VIC and 64 is that the printer, disk and modem all need the same I/O chip, and can't all have it at once. Since there is no way to be sure when new information will be coming in over the modem, most terminal programs on the 64 give it priority.

Information coming in over the modem is then copied into the 64's large memory, rather than immediately to disk or printer. Then, when you decide it won't interfere with incoming information, the entire memory buffer is emptied, to the disk, the printer or both, and the cycle begins again.

Programs are a special case. Many terminal programs cannot properly send or receive Basic programs. To do this requires extra programming, because they are normally kept in a very compact (tokenized) form. They need to be sent between modems in that same form, or else converted from it for transmission, and back to it at the other end. Both options are difficult enough that many programs don't allow for it, and others can only handle it through a slow two-or-more-step conversion process.

On to the Reviews

In the rest of this article, I'll review several of the best programs currently available, rating them for both features and ease of use. To determine which is best for your needs, pay special attention to the accompanying chart. It details the abilities and requirements of the five best terminal programs currently available for the 64. (VIC owners should pay special attention to the review of Terminal 40.)

Each of these programs has been independently reviewed by the *Midnite Software Gazette*, and I have attempted to include insights from those reviews in my comments here. Since new programs appear almost daily, I urge you to watch for reviews of other terminal programs as they appear, and also to seek

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Chart Showing Features of Five Terminal Programs.

BASIC OPERATIONS:	Smart 64 Terminal	SuperTerm	Telstar	Vidtex	VIP Terminal
Control via:	menu/command	menu	menu	command	menu/ icon/command
Help screens?	no	no	no	yes	yes
Status line?	no	yes	yes	no	no
Manual easily usable as:	tutor	tutor	reference	tutor/ reference	tutor
Preliminary?	yes	yes	no	no	no
SETTINGS:					
Full range of settings?	yes	yes	yes	no	yes
Storable setups?	yes	yes	yes	yes	yes
Reliable at:					
300 baud?	yes	yes	yes	yes	yes
1200 baud (half duplex)?	no	yes	no	yes	yes
Keys:					
Break?	yes	no	yes	yes	yes
Escape?	no	yes	no	yes	yes
Function keys:	6	52	10	10	20
Definable characters?	yes	yes	yes	no	yes
Screen Size:					
40 columns?	yes	yes	yes	yes	yes
80 columns via:	hardware	scrolling	–	–	software
if more, maximum is	–	132	–	–	106
Timers:					
Alarm?	yes	no	yes	no	yes
Clock?	yes	yes	yes	no	yes
Word wrap?	yes	no	no	yes	yes
Selectable line-feeds:					
Screen?	yes	yes	no	no	yes
Printer?	yes	yes	yes	yes	yes
Selectable colors?	yes	yes	yes	yes	yes
Alpha lock?	no	yes	yes	no	yes
EQUIPMENT:					
Sold on:	disk	disk/tape	cartridge	disk	disk/tape
Documented Modem hookups:					
1650?	yes	no	yes	yes	yes
1600?	yes	no	yes	yes	yes
1011-A interface?	no	no	no	yes	yes

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	Smart 64 Terminal	SuperTerm	Telstar	Vidtex	VIP Terminal
Compatible Disks:					
1541?	yes	yes	yes	yes	yes
MSD?	yes	yes	yes	yes	yes
4040 via bus card?	yes	no	no	yes	yes
8050 via bus card?	no	no	no	yes	no
Disk device # selectable?	yes	no	yes	yes	yes
Disk commands?	yes	yes	yes	yes (some)	yes
Compatible printers:					
Serial bus CBM?	yes	yes	yes	yes	yes
Serial bus ASCII?	no	yes	yes	no	yes
Others listed?	yes (IEEE-488)	yes (smart a)	no	no	no
Printer settings:					
Device #?	yes	no	yes	yes	yes
Secondary address?	yes	yes	yes	yes	yes
BUYING CONSIDERATIONS:					
Retail cost:	$40	$150	$50	$40	$50
Warranty:	30-day	90-day	60-day	none	1-year
Copy protection used:	DOS	cartridge	cartridge	none	DOS
If DOS, price of spare:	$10				$10
MAKING CONNECTIONS:					
1650 on/off hook control?	no	no	yes	no	yes
Auto answer?	yes	no	yes	no	yes
Autodial:					
1650?	yes	no	yes	yes	yes
Smartmodem?	no	no	yes	no	yes
Re-try?	yes	no	no	no	yes
Autolog:					
Size of "directory":	9	d. files	8	d. files	16
Depth of "dialog":	0	1	1	no limit	2
FILE TRANSFERS:					
Download from:					
Text files?	yes	yes	yes	yes	yes
Basic program files?	yes (2 step)	yes (2 step)	yes	no	yes
Binary files?	no	no	yes	yes	yes
Punter BBS?	no	yes	no	no	yes
CompuServe ".img"?	yes (2 step)	yes	no	yes	no
CompuServe graphics?	no	no	no	yes	yes
Upload programs as:					
Text?	yes (2 step)	yes (2 step)	yes	no	yes
CompuServe ".img"?	yes (2 step)	yes (2 step)	no	yes	no
Punter BBS format?	no	yes	no	no	yes
Capture info to:	disk/printer	disk/tape printer	disk/tape printer	disk/tape printer	disk/tape printer

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	Smart 64 Terminal	SuperTerm	Telstar	Vidtex	VIP Terminal
Screen dump to printer?	yes	yes	no	yes	no
Buffer size:	28K	18K	2 of 8K	32K	7K
Obeys XON/XOFF?	yes	yes	yes	yes	yes
Line-end delay on upload?					
Delay with:	nulls	timer	none	none	timer
Wait for prompt?	no	yes	no	yes	yes
EDITING:					
Of buffer?	yes	yes	yes	yes	yes
Off-line message preparation?	yes	yes	yes	yes	yes
TERMINAL EMULATION:					
DEC VT-52?	no	yes	no	no	yes
DEC VT-100?	no	yes	no	no	no
CUSTOM CHANGES:					
User changeable?	no	yes	no	yes	no
Links to programs?	no	no	yes	yes	planned

the advice of your local dealer and user's group.

I will now discuss the various sections of the chart.

Basic Operations

The easiest programs for newcomers to use are controlled by icons (pictures) that you move via a joystick. Almost as easy to use are menus, which have you make a selection from a few choices. Neither of these is as powerful or fast as control via commands, but only skilled regular users will remember the commands of a complicated program.

Best are programs that can be controlled in more than one way. Help screens serve as reminders of how to use the program, giving instructions when and where needed. They're good to have.

A status line is like the instrument panel in a car, keeping you advised of important information at a fixed spot on the screen. However, they do eliminate at least one line of text. Seek one anyway.

When computer manuals are readable at all, they tend to fall into one of two classes—a tutorial guide to help you get started using the program, or reference manuals that you can use to quickly brush up on the rules of a forgotten feature of a program. Both are necessary.

Preliminary manuals are temporary stop gaps in the event a program is sold before it is really finished. They are rarely worthy of praise.

Settings

Although a few settings will be enough, in most cases, to be able to talk with all other modems, your terminal program will need to provide both full and half duplex, 300 and 1200 baud, even, odd, mark, space and no parity. It will also need a choice of 1 or 2 stop bits, and 7 or 8 bits per character. Nearly all programs provide all of these.

After you've spent a while setting up your terminal program to work just the way you want, you'll be able to store all your setup commands, so you won't have to repeat them the next day.

Most terminal programs work well at 300 baud. But 1200-baud modems are becoming more common, and only the best programs can keep up with them properly.

To work well with some remote systems, your terminal program must provide a way to make a special break signal not offered on the VIC or 64 keyboard, as well as assign what is known as an escape key to be CHR$(27).

The better programs carry this further and allow you to completely define what character is sent for every key on the keyboard. Some also send a whole string of characters when special function keys are pressed.

Since most of the computers you can reach by phone arrange their information to fit 80-column screens, it is quite useful to be able to show 80 columns. You can best accomplish this with an added hardware cartridge, but it's expensive.

Next best, if you have a good display monitor, is software that imitates 80 columns. Horizontal scrolling also works, though you may become seasick after watching it for a while.

Having a clock and alarm in the program may help keep you from running up a higher bill than you planned.

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Word wrap is especially important in programs that lack 80-column displays; it keeps words from being broken off and split at the end of a line. Instead, they are moved to the beginning of the next line.

Having selectable line feeds protects against having either double- or un-spaced text on your screen or printer. If you need this, you'll need it badly.

Allowing a choice of colors may ease your eyes in working with a particular TV or monitor.

Alpha lock is like a shift lock, except that it only works on the letters A–Z. You might need it when calling a system that can't handle lowercase letters.

Equipment

Cartridges are very convenient, fast and durable, but limited in capacity. Disks are spacious and fairly fast, but fragile. Tapes are very slow, but cheap. Take your choice.

Commodore sells the 1650 automodem, the 1600 VIC-modem, and the 1011-A RS-232 interface to other modems. Be sure your program works with what you have.

Similarly, all tested programs work with the 1541 disk, but many VIC and 64 owners use other disks and interfaces. Be sure your gear is covered. (Programs that fail with the BusCard may also fail with other IEEE-488 interfaces.)

If you have two disk drives, you'll need a way to select which device to use.

It's *very* handy to be able to read a directory or give other disk commands from within a terminal program.

All tested programs work with Commodore's 1525 serial bus printer. Some will also work with non-Commodore ASCII printers connected to the same port, even without code correction, and a few work with other connections.

To use some printers, you'll need a choice of device numbers and secondary addresses.

Buying Considerations

Prices vary...

How long will the company replace their product without charge if it fails?

Various tricks keep you from giving copies of a program to all your friends. Disk (DOS) protection is cheapest, but most fragile. Know how to get a spare copy, and for how much. Cartridges and dongles cost more, but last longer. No protection at all is best by far.

Making Connections

The ability to hang up or lift the hook on the 1650 modem from the program is a minor convenience, as is being able to set the computer to pick up the phone for you when it rings.

Much more useful is being able to dial your calls within the program, especially if the program will also keep dialing until it gets an answer. (Some modem lines are very busy.)

It's also extremely helpful to have the program remember the numbers you'll be calling, along with the dialogue necessary to sign on to various systems.

File Transfers

Downloading lets you capture copies of information coming from other computers for later use. Simplest is a text file of what you read, followed by Basic and machine language

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(binary) programs. More complicated are the Punter BBS and CompuServe files, which require special programming. Very important.

Uploading is the reverse, sending things back to the remote computer. It might be important.

Capturing information is a variation of downloading. Material received is often held in a memory buffer for later dumping to disk, tape or printer. Very important. It's also handy to be able to dump a copy of whatever's on the screen at the moment to a printer.

The bigger the capture buffer, the better, because when it fills, the other computer has to wait until you do something with it.

XON and XOFF are special characters that tell the other computer to wait while you do something with your full buffer. Similarly, an overloaded remote computer may ask your computer to pause a moment while it catches up. In either case, a failure to comply means lost data. Very important.

Since many remote systems can only handle information a line at a time, and sometimes only at typing speed, it's good to have ways of slowing down an upload to speeds they can handle. A delay often works, although being able to watch for a special "ready" character is more flexible. Having a choice between both approaches is best of all.

Editing

Since much of what you'll read isn't worth saving, it's nice to be able to edit it before sending it to a disk or printer. The same may be true of what you write.

Terminal Emulation

If you must talk to a computer that only talks properly to a certain brand of terminal, it's handy to be able to copy the way that terminal works.

Custom Changes

If you write programs, you'll appreciate being able to customize those you buy. Even if you only run programs, it's good to have them able to work peacefully together.

'64 Terminal and Terminal 40

'64 Terminal and Terminal 40 are Midwest Micro Associate's (PO Box 6148, Kansas City, MO 64110) simplest terminal programs for the 64 and VIC, respectively. These programs allow you to set all the usual modem parameters. You can also set line feeds and colors. All ASCII and Commodore characters may be sent, except for the lowercase alphabet on the VIC.

The 64 version has a far larger workspace (buffer) for copying incoming information than the VIC version, and displays both upper- and lowercase letters.

The best-known feature of Terminal 40 is its ability to display 40 columns on a VIC. Scrolling in the VIC version is also incredibly smooth—one dot at a time, making for very easy reading.

The receive buffer can be switched on and off, and reviewed at any time. However, once a paper copy is begun, the buffer

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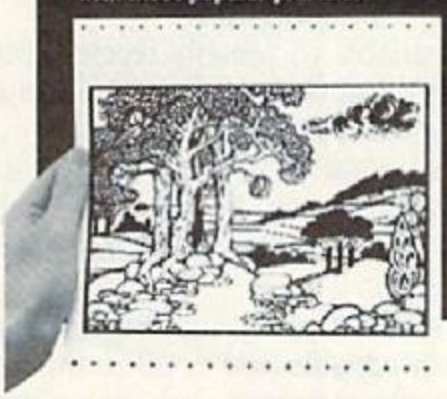

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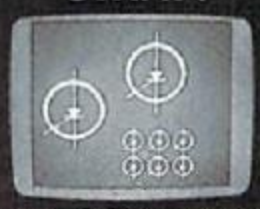
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will be erased even if something goes wrong with the paper copy. One other unusual option strips extra tabs and spaces from received information to save space in the buffer and improve readability on narrow screens.

Graph-Term 64

Using the high-resolution drawing capability of the 64, and the even higher resolution plotting capability of the 1520 printer/plotter, Graph-Term 64 (Bennett Software, 3465 Yellowstone, Ann Arbor, MI 48105) accepts data from mainframe computers as though it were a Tektronix 4010 graphics terminal. (It even compensates for the 64's screen not being square.)

Though the 200 × 320 resolution of the screen and the 480 × 630 resolution of the plotter don't match the 780 × 1024 resolution of the Tektronix, the price of a 64, disk and plotter also doesn't compare with the price of a Tektronix. This makes the 64 attractive to engineers and scientists who need to use Tektronix graphics, but have limited budgets.

Besides displaying and printing graphics plots, Graph-Term 64 also allows you to create new plots and upload them to other computers, again as though it were a Tektronix 4010. Like other intelligent terminals, it can also capture the data it displays, and save it to disk or tape for reloading another time. And, like most any terminal, Graph-Term 64 also handles ordinary text.

On the other hand, the engineering background of the program is apparent in its lack of bells and whistles to ease its use. You should be familiar with Basic, and able to alter simple programs in order to take advantage of Graph-Term 64. Otherwise, you'll be limited to its standard 300-baud, 8-bit, no-parity, 1-stop bit, full-duplex setup.

If you need this program at all, you need it rather badly, and it will seem quite a bargain to you.

The Smart 64 Terminal

Like most of the other fine programs in this group, the third release of the Smart 64 Terminal (Microtechnic Solutions, PO Box 2940, New Haven, CT 06515) can transmit or receive programs and, with some extra steps, convert the transmitted characters into a form that your 64 or VIC can run.

Some remote systems need extra helps; this program can set the maximum number of characters to send before adding a carriage-return character code. It is also the only tested program for the 64 that is compatible with the former 1515 printer and explicitly supports the new 1526 printer, too.

If you have a choice of numbers to call to reach a desired system, Smart 64 Terminal will call each of them in turn until one answers. Other special needs it supports include a preprogrammed response to a Control-E inquiry by a host system, and the hardware X-Line handshake used by some directly-wired computer systems.

Although the program can't be copied, you can make multiple data disks. As temporary storage space in the computer is filled with incoming data, a gauge at the right side of the screen will slowly descend to show how much room is left; it should hold over 16 minutes of data before being automatically transferred to the disk drive.

Smart 64 Terminal has many desirable features, at a reasonable price, but is a bit inconvenient to use with special protocols, such as CompuServe's. Also, its preliminary manual leaves a lot to be desired.

SuperTerm

Midwest Micro's SuperTerm (PO Box 6148, Kansas City, MO 64110) includes most features offered by other terminals, and a few of its own. The manufacturer prefers to call it a terminal emulator, and with good reason—it is able to mimic even DEC's elaborate VT-52 and VT-100 mini-computer terminals, and the company plans to add dozens of other terminal emulations to the program.

These emulations allow SuperTerm to be used with a very large computer and to behave like that computer's own terminals. Some of these have up to 132-column screens, which SuperTerm mimics by scrolling sideways. This can be confusing, but a Freeze mode partially eases the pain.

It's too bad SuperTerm doesn't use the software 80-column and smooth-scrolling techniques Midwest Micro pioneered in Terminal 40 (see separate review).

My favorite feature in SuperTerm is its support of file up- and downloading, via the PET bulletin board and CompuServe methods. It is also able to receive programs from non-standard systems and convert them into Commodore programs, though some changes may still have to be made by hand.

Captured information can be edited with most of the commands of a word processor. If you have the company's special Smart ASCII printer interface, you may even print received information at full speed *as you receive it*, something no other tested program can do. To further ease the chore of chatting with other systems, troublesome characters can be filtered out when received, either full time or only when they follow a carriage return (some of the worst do).

SuperTerm's only really negative feature is its instruction manual, which is still preliminary after nine months, and doesn't even mention some of SuperTerm's abilities.

Telstar 64

Telstar 64, from Eastern House Software (3239 Linda Drive, Winston-Salem, NC 27106), is the 64 version of Carl Moser's excellent STCP for CBM and PET computers, a product I've been using regularly for over a year. Like STCP, Telstar 64 is among the most powerful terminal programs available, with the expected options, but easier to learn and use than most.

It is in cartridge form, which makes it especially convenient. It is able to automatically tokenize a Basic program as it is received and stored to disk without the extra translation steps most other terminal programs need. This allows easy sharing of standard programs with owners of other brands of computers.

Other notable features include full-cursor editing (in Line mode) and filtering of troublesome characters. Telstar 64 is also the only product in this group to offer an Echo mode; this lets its users stay in full duplex when talking to each other, with added assurance of reliable communications.

Unfortunately, Telstar 64 is unable to reliably receive files from my Tandy 100 at 1200 baud, but this won't bother those who use Commodore's 1600 and 1650 modems.

Another complaint is that the CTRL key isn't used as itself—Telstar substitutes the left-arrow key. It also lacks both the Punter and CompuServe protocols for uploading and downloading files.

Even so, because it is the only completely cartridge-based terminal I've tested, and is both capable and comfortable to use, I use it daily with my portable computer. It is also a real bargain. I recommend it.

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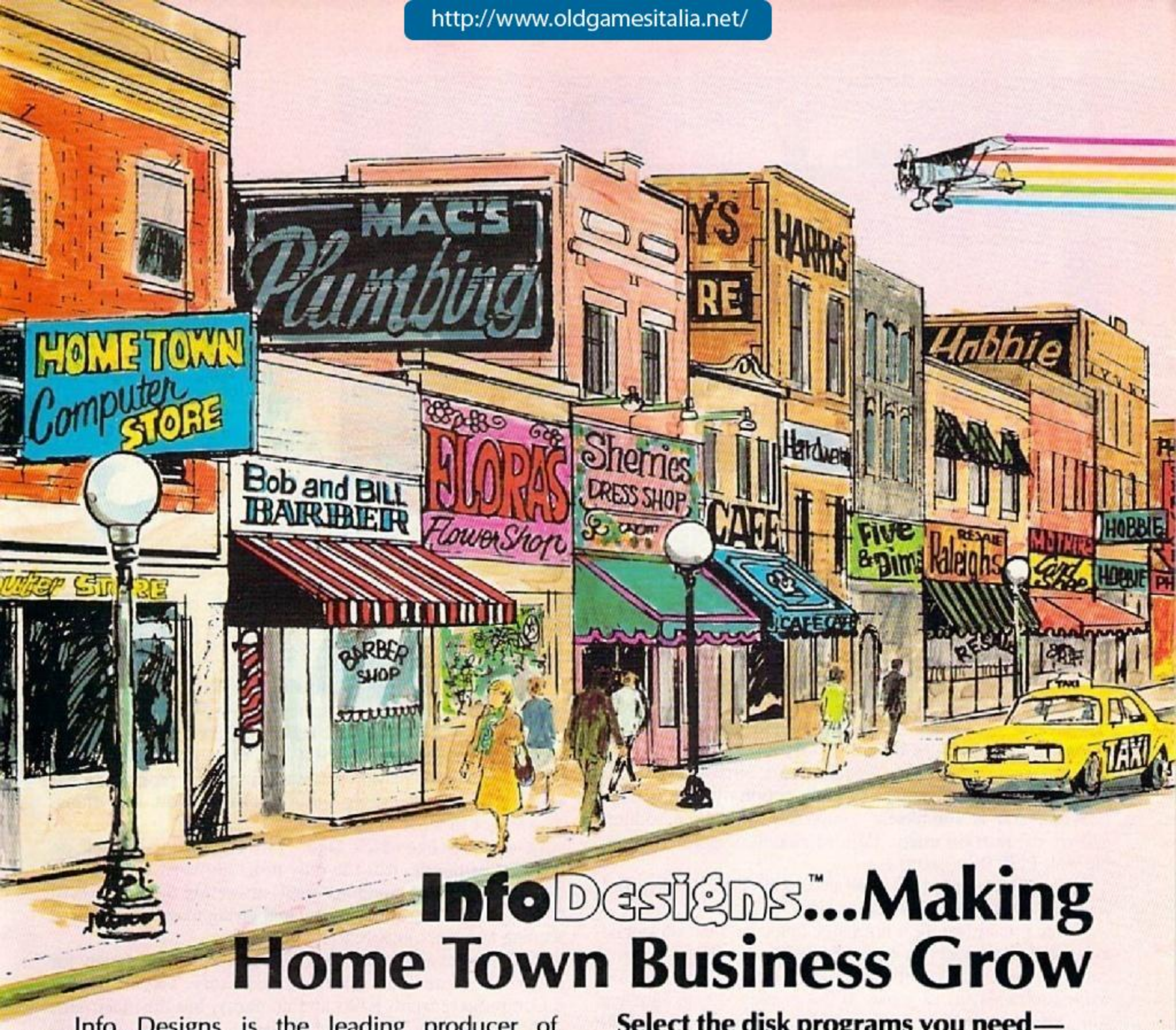

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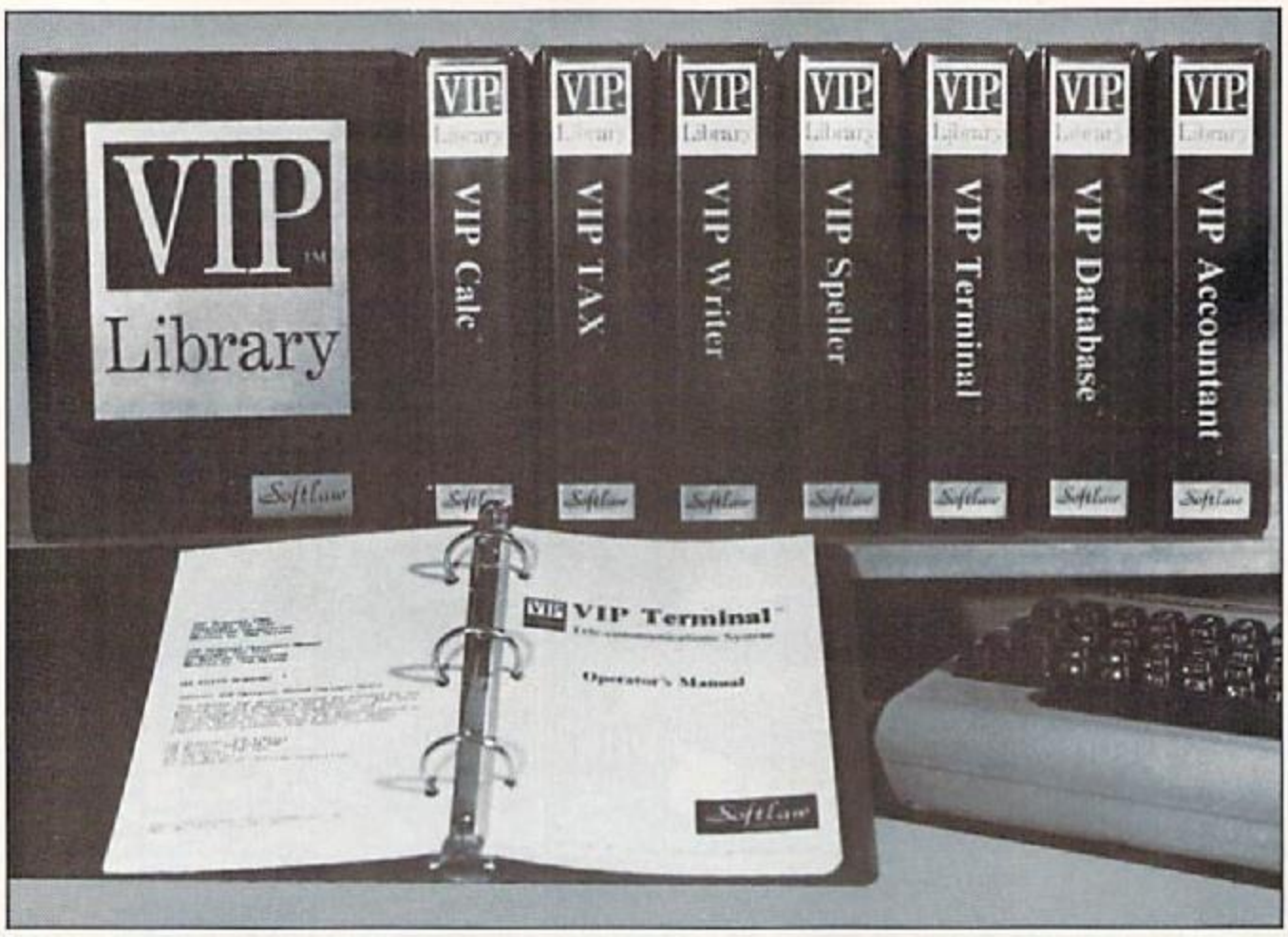

Vidtex

Vidtex, from CompuServe Information Service (5000 Arlington Centre Blvd., Columbus, OH 43220), is for serious users of the CompuServe system. This intelligent terminal package takes full advantage of every option offered by CompuServe, and is completely compatible with Commodore's chosen information utility. (Unfortunately, it is not compatible with PET BB systems.)

That you don't need the program disk in the drive after start-up saves loading time and disk swaps.

Vidtex's main feature is error-free uploading and downloading, using CompuServe's image files. You can also send ahead pages for storing different screens in memory, a big time saver when you're playing its games. It has excellent screen handling, with automatic cursor positioning by the host system. With Vidtex, CompuServe knows all the commands to clear your screen, control colors, format your screen and so on.

Vidtex is the only tested program that can automatically dial and automatically log onto real systems without your having to press any key beyond running the program. This is very helpful, and an amazing oversight in its competitors.

I would have liked to load the program from disk and immediately see a menu of options, as when you sign on to CompuServe itself. New users may become frustrated long before finding out how to display its two help screens.

You'll really notice the lack of an 80-column option, but work-wrap keeps things fairly readable, and being able to display downloaded color graphics partly makes up for it. The manual is brief, but mostly usable.

If you spend any time on CompuServe, this is the terminal program for you. Highly recommended.

VIP Terminal

Imagine Commodore's Magic Desk program on-line. Softlaw has made a valiant attempt to ease the hassles of using a full-featured terminal program.

In addition to a high-resolution desk image at the start of the program, VIP Terminal from Softlaw (9072 Lyndale Ave. S., Minneapolis, MN 55420), makes full use of icons and joystick selection of options—next best thing to a game. Then, when you're done playing and want to use the program, it has several dozen help screens that explain almost everything. You've got to see it to believe it.

However, unlike Magic Desk, VIP Terminal has almost no limits to its power. It is the only program reviewed here that can serve as a host computer itself, answering the phone even when you're not around, taking and giving messages and even sending and receiving programs.

It also stores all the usual modem parameters separately for each of the 16 numbers in its phone directory. This means that if CompuServe wants 8 bits and no parity, but the mainframe at the office wants 7 bits and even parity, VIP Terminal will set up for both automatically.

Unfortunately, this great idea slips badly at one point; its sign-on routine only stores one prompt and one response—not enough to sign on to any network I've ever used. I couldn't figure out any way to set modem parameters except through directory entries.

Another aspect that could be improved is off-line message preparation, currently limited to the 127 characters that can be held in each of the 20 function keys. A few of you may be interested in a gimmick that claims to tone-dial for you through the TV speaker and your phone handset, but VIP Terminal's chime on the quarter hour and beep at the right margin are more useful.

If you're looking for a very powerful terminal program that's easy to use, VIP Terminal should be at the top of your shopping list. R

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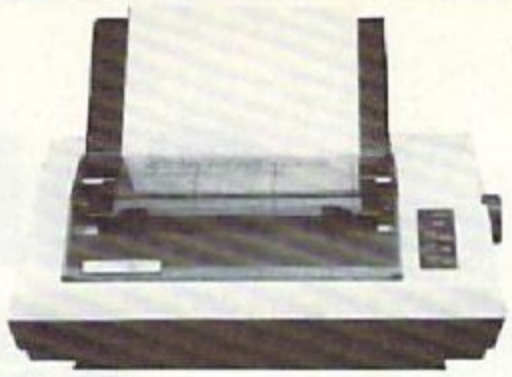

PRINTING MODE	DOT MATRIX (H x V) & SPACES	NUMBER OF COLUMNS	PRINT SPEED (CPS)	CHARACTER SPACING (CPI)	PASS
DP Mode:					
Pica	9 x 8 + 3	80	50	10	1
Elite	9 x 8 + 1	96	60	12	1
Condensed	5 x 8 + 2	136	86	17	1
NLQ Mode:	NOTE: There is expanded (double-width) printing function in every character mode.				
Pica	9 x 16 + 3	80	25	10	2
Elite	9 x 16 + 1	96	30	12	2
Proportional	N x 16	—	—	—	2
Super/Subscript	5 x 8	136	43	17	2
Italic Cursive	12 x 16	80	25	10	2

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Enlightened Graphics

Convert those curious Commodore custom characters into something we humans can understand, and you will get easy-to-read, professional-looking listings.

By Alejandro A. Kapauan

Lister-Filter, a listing-translator program, allows you to print easy-to-read listings similar to the ones in this publication. It filters out all Commodore graphics characters output to the screen, printer or RS-232 devices (device numbers 3, 4 and 2, respectively) and replaces them with easy-to-read non-graphic equivalents.

For example, the clear-screen character will print as [CLR] instead of as a reverse-video heart character. A shifted space will print as [SHFT SPC], while the character you produce by holding down the Commodore logo key and typing A will print as [COMD A]. In addition to these features, Lister-Filter also compresses long repeated sequences of graphics, cursor control or blank characters into a single string.

A string of 22 cursor-right characters will print as [22 RIGHT]. A single space will print as a space, while two or more spaces in sequence will print as [n SPC], where n is the number of spaces. The program is especially useful for making printed listings if your printer or printer interface has no graphics capabilities. Even if you do have a graphics printer, listings processed by this translator are more readable than regular graphics listings.

Lister-Filter was originally written for the expanded VIC-20, but it will run without modifications on a Commodore 64. It is written entirely in machine language and uses 630 bytes of your RAM. However, you don't have to know machine language to use the program and you do not even need a machine language monitor to type it in. The Basic loader program (see Listing 1) will do the proper loading and relocation of the Lister-Filter program.

Using the Program

Type in the Basic loader program carefully. This may be a little difficult because of the numerous Data statements; however, checks are provided in the program so that you can easily locate the errors in the data when you run it. After typing in the program, make sure to save it.

When you run the program for the first time, it may contain some errors. If there is a Syntax error, examine and correct the offending line. If you get a message DATA ERROR NEAR LINE n, examine line n for errors, or possibly the line before it. If you get an Out of Data error, it is likely that you just left out a Data statement. Make the necessary corrections and save the program again.

Once the loader program executes to completion, and the screen displays FILTER INSTALLED, then all output directed to the screen, printer or RS-232 device will be translated. You may type NEW to delete the loader program, but the Lister-Filter program will still be there. To make a listing of another program, just load it into your computer and list it in the normal manner. To dis-

RUN It Right

VIC-20
Commodore 64

Address all author correspondence to Alejandro A. Kapauan, 141-6 Airport Road, West Lafayette, IN 47906.

Listing 1. Lister-Filter program for the C-64 or VIC-20.

```
10 PRINT"{SHFT CLR}LISTER-FILTER":PRINT"LOADING DATA":P
   RINT
20 B=PEEK(55)+256*PEEK(56):IFPEEK(B+2)=154THEN40
30 B=B-630:B2=INT(B/256):B1=B-256*B2:POKE55,B1:POKE56,B
   2:POKEB+2,154:CLR
40 B=PEEK(55)+256*PEEK(56):A=B
50 FORL=5000TO5370STEP10:S=0:PRINT"{CRSR UP}LINE"L
```

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able the translator when you no longer need it, you can warm start your computer by holding down the run/stop key and hitting the restore key. To reinstall the filter later, just load the loader program and run it.

You can modify what the translator will print for some graphics characters by changing lines 1000 to 1350 in the loader program. The variable C is set to the CHR$ code of the character, while the string C$ is set to the string to be printed. A GOSUB4000 then installs the code in the filter's exception table.

Lines may be added after line 1350 for other characters, like the extra Commodore 64 color-control characters, which are unavailable on the VIC-20. However, the total exception-table space may not exceed 256 bytes. The program will tell you if the table strings are too long. You might have to shorten some strings to make room for the others.

How It Works

Lister-Filter is basically a program that is placed just before the VIC's or C-64's normal output routine. This is done by modifying the output vector at locations 806 and 807 to point to the Lister-Filter program. After it does its translating, the program then passes control to the normal output program to print the translated characters.

The translating process is fairly straightforward. First, the character to be printed is checked against the previously received character. If it is the same, then a count of accumulated characters is incremented, and the character is not immediately printed. If it is not the same, then the character is saved, and the previously-buffered characters are printed. That way, repeated characters can be compressed as a single string.

The character is checked to see if it is in the exception table. If it is not, it's checked to determine if it is a Commodore logo key graphics character. If it's neither of those, it's checked to see if it's a shifted character. The appropriate string representation of the character is printed, with any necessary numeric count. If the character is a normal printable one, then it's printed as is.

If you are knowledgeable in machine language programming, you might want to disassemble Lister-Filter to examine it in detail.

Lister-Filter is a handy program for making clear, professional listings, and it helps prevent the eyestrain and headaches caused by reading cryptic graphics characters. R

Listing 1 continued.

```
60 FORI=1TO10:READV:IFV>255THEN90
70 S=S+V+1:POKEA,V:A=A+1:NEXTI:READV:IFV<>STHEN90
80 NEXTL:READV:GOTO100
90 PRINT"DATA ERROR":PRINT"NEAR LINE"L:END
100 FORL=5390TO5640STEP10:PRINT"{CRSR UP}LINE"L
110 READX:READY:READV:IFV<>X+YTHEN90
120 X=X+B+1:Y=Y+B:B2=INT(Y/256):B1=Y-256*B2:POKEX,B1:PO
    KEX+1,B2:NEXTL
130 GOSUB1000:IFPEEK(55)=PEEK(806)ANDPEEK(56)=PEEK(807)
    THEN160
140 POKEB+324,PEEK(806):POKEB+325,PEEK(807):POKEB+369,0
150 POKE806,PEEK(55):POKE807,PEEK(56)
160 PRINT"FILTER INSTALLED":END
1000 A=B+373
1010 C=32:C$="SPC":GOSUB4000
1020 C=5:C$="WHT":GOSUB4000
1030 C=17:C$="DOWN":GOSUB4000
1040 C=18:C$="RVS ON":GOSUB4000
1050 C=19:C$="HOME":GOSUB4000
1060 C=28:C$="RED":GOSUB4000
1070 C=29:C$="RIGHT":GOSUB4000
1080 C=30:C$="GRN":GOSUB4000
1090 C=31:C$="BLU":GOSUB4000
1095 C=92:C$="LB.":GOSUB4000
1100 C=96:C$="SHFT *":GOSUB4000
1110 C=123:C$="SHFT +":GOSUB4000
1120 C=124:C$="COMD -":GOSUB4000
1130 C=125:C$="SHFT -":GOSUB4000
1140 C=126:C$="PI":GOSUB4000
1150 C=127:C$="COMD *":GOSUB4000
1160 C=133:C$="F1":GOSUB4000
1170 C=134:C$="F3":GOSUB4000
1180 C=135:C$="F5":GOSUB4000
1190 C=136:C$="F7":GOSUB4000
1200 C=137:C$="F2":GOSUB4000
1210 C=138:C$="F4":GOSUB4000
1220 C=139:C$="F6":GOSUB4000
1230 C=140:C$="F8":GOSUB4000
1240 C=144:C$="BLK":GOSUB4000
1250 C=145:C$="UP":GOSUB4000
1260 C=146:C$="RVS OFF":GOSUB4000
1270 C=147:C$="CLR":GOSUB4000
1280 C=148:C$="INST":GOSUB4000
1290 C=156:C$="PUR":GOSUB4000
1295 C=157:C$="LEFT":GOSUB4000
1300 C=158:C$="YEL":GOSUB4000
1310 C=159:C$="CYN":GOSUB4000
1320 C=160:C$="SHFT SPC":GOSUB4000
1325 C=168:C$="COMD LB.":GOSUB4000
1330 C=169:C$="SHFT LB.":GOSUB4000
1340 C=186:C$="SHFT @":GOSUB4000
1350 C=20:C$="DEL":GOSUB4000
1998 IFA>B+627THENPRINT"STRINGS TOO LONG":END
1999 RETURN
4000 POKEA,C:A=A+1:FORZ=1TOLEN(C$):POKEA,ASC(MID$(C$,Z,
    1)):A=A+1:NEXTZ
4010 POKEA,0:A=A+1:POKEA,0:RETURN
5000 DATA72,165,154,201,2,48,4,201,5,48,910
5010 DATA4,104,76,67,125,104,141,12,3,72,718
5020 DATA152,72,138,72,162,3,189,3,0,168,969
5030 DATA189,113,125,157,3,0,152,157,113,125,1144
5040 DATA202,16,239,173,12,3,201,255,208,4,1323
5050 DATA169,126,208,14,201,224,144,4,233,64,1397
5060 DATA208,6,201,192,144,2,233,96,197,5,1294
5070 DATA208,17,238,3,0,120,248,165,4,24,1037
5080 DATA105,1,133,4,216,88,24,144,85,172,982
5090 DATA5,0,133,5,165,3,240,53,140,6,760
5100 DATA0,162,0,189,117,125,240,94,197,6,1140
5110 DATA240,9,232,189,117,125,208,250,232,208,1820
5120 DATA238,201,32,208,6,165,3,201,2,144,1210
5130 DATA112,32,28,125,232,189,117,125,240,6,1216
```

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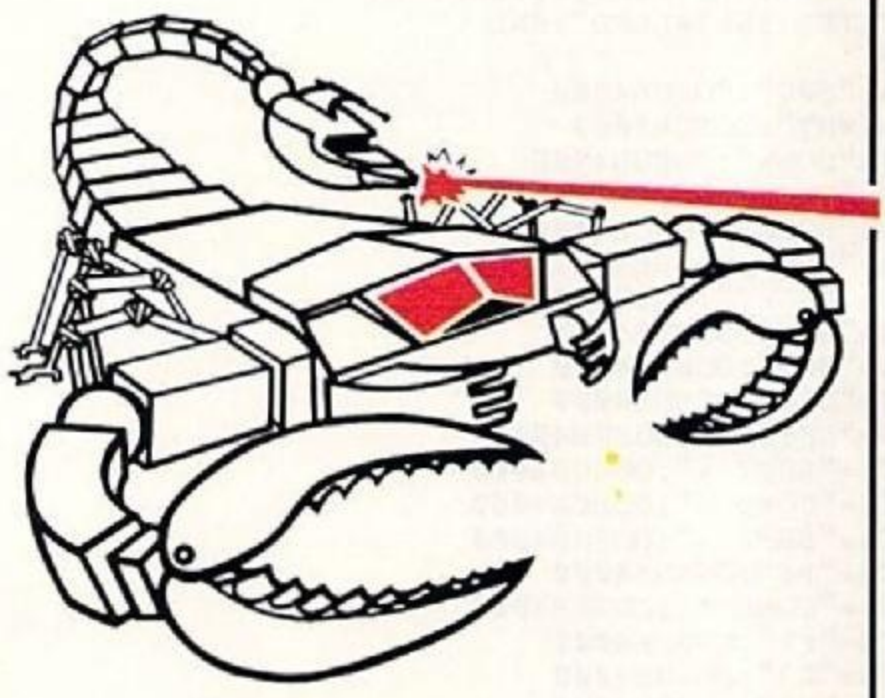

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Listing 1 continued.

```
5370 DATA1,10,46,32,83,80,67,0,5,87,421
5380 DATA256
5390 DATA12,323,335
5400 DATA30,369,399
5410 DATA37,369,406
5420 DATA103,373,476
5430 DATA113,373,486
5440 DATA131,284,415
5450 DATA135,373,508
5460 DATA140,323,463
5470 DATA148,323,471
5480 DATA163,323,486
5490 DATA176,369,545
5500 DATA183,369,552
5510 DATA211,284,495
5520 DATA216,357,573
5530 DATA221,323,544
5540 DATA230,326,556
5550 DATA233,323,556
5560 DATA245,284,529
5570 DATA250,363,613
5580 DATA255,323,578
5590 DATA266,323,589
5600 DATA274,323,597
5610 DATA286,323,609
5620 DATA304,323,627
5630 DATA314,323,637
5640 DATA319,323,642
```

```
5140 DATA32,67,125,24,144,244,169,93,32,67,1007
5150 DATA125,169,1,133,3,133,4,165,5,201,949
5160 DATA13,208,11,32,67,125,169,0,133,3,771
5170 DATA133,4,133,5,162,3,189,113,125,168,1045
5180 DATA189,3,0,157,113,125,152,157,3,0,909
5190 DATA202,16,239,104,170,104,168,104,24,96,1237
5200 DATA240,205,165,6,56,233,161,144,30,133,1383
5210 DATA6,32,28,125,162,0,189,101,125,240,1018
5220 DATA6,32,67,125,232,208,245,174,6,0,1105
5230 DATA189,70,125,32,67,125,24,144,163,165,1114
5240 DATA6,201,97,144,27,32,28,125,162,0,832
5250 DATA189,107,125,240,6,32,67,125,232,208,1341
5260 DATA245,165,6,56,233,32,32,67,125,24,995
5270 DATA144,221,165,6,32,67,125,206,3,0,979
5280 DATA208,246,240,172,169,91,32,67,125,165,1525
5290 DATA4,201,2,48,27,74,74,74,74,240,828
5300 DATA6,24,105,48,32,67,125,165,4,41,627
5310 DATA15,24,105,48,32,67,125,169,32,32,659
5320 DATA67,125,96,76,42,163,75,73,84,64,875
5330 DATA71,43,77,92,92,78,81,68,90,83,785
5340 DATA80,65,69,82,87,72,74,76,89,85,789
5350 DATA79,64,70,67,88,86,66,67,79,77,753
5360 DATA68,32,0,83,72,70,84,32,0,1,452
```

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Cops, Robbers And Computers

By Christine Adamec

At first the Commodore 64 was just a fascinating toy to Detective Randy Mooseles, who played numerous games of Jumpman and Star Battle after bringing it home last year. Then he started thinking about other possible uses and hit upon a unique application...

Randy Mooseles, age 29, is a powerfully built man with penetrating brown eyes. He is a police detective for the city of Melbourne, Florida (population 50,000).

"I suddenly realized I could bring my Commodore 64 to work and put together a suspect file," said Mooseles, leaning forward in his chair to explain.

Is this central Florida city a hotbed of crime? No, according to Mooseles, the crime rate here isn't much worse than other comparable cities nationwide. But, like many other cities throughout the country, Melbourne residents are suffering an increasing problem with certain types of felonies. Maybe, reasoned Mooseles, his computer could help him track down some of these evildoers.

For the Record

But why would he want to create his own criminal database? Doesn't the Melbourne Police Department already have computer

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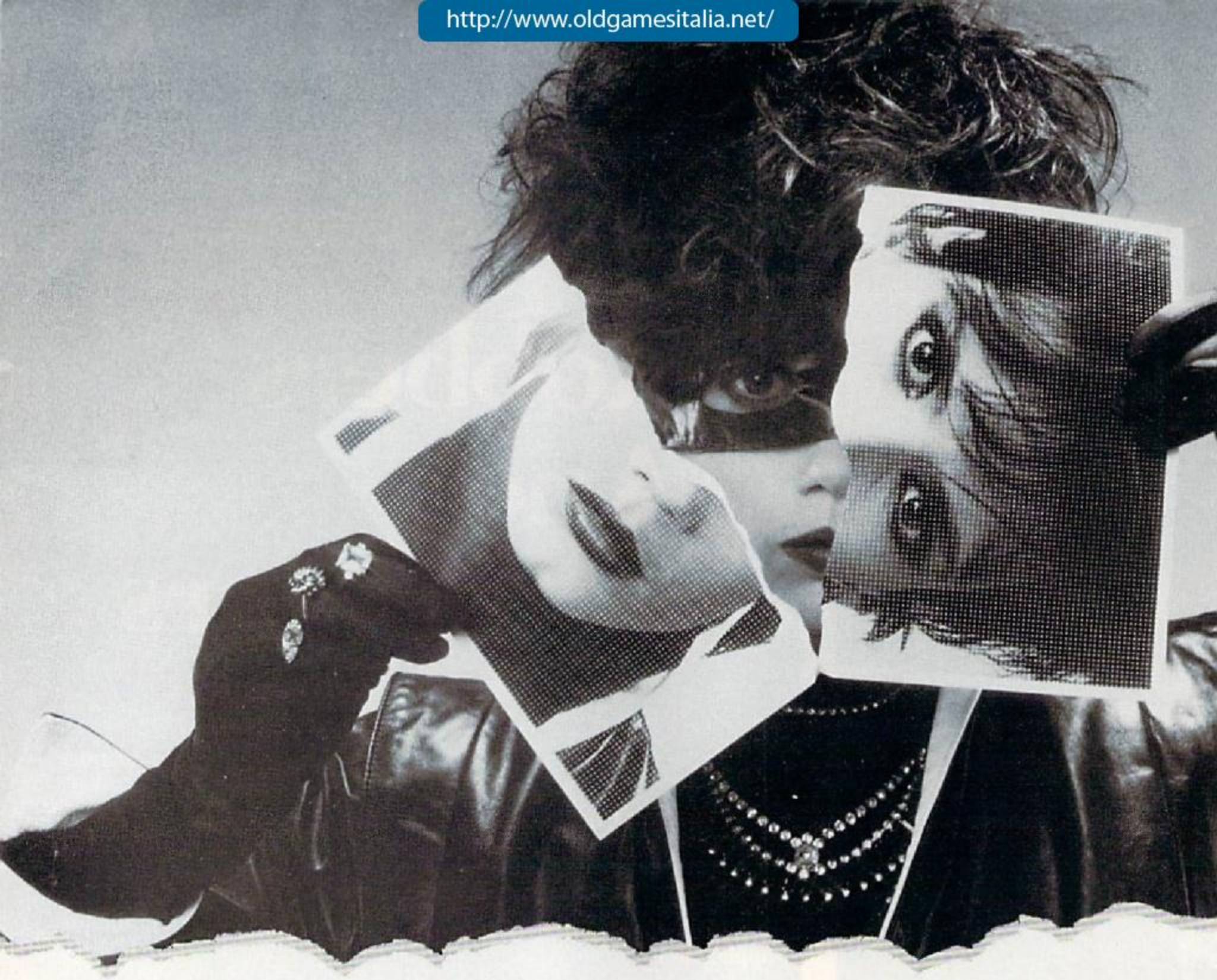

A murder is a very big thing here; we know about them.

hookups to the state and county, as well as to the federal offices? "Yes, we've got terminals," says Mooseles. "We're constantly using our hookup to the CJIS (the Criminal Justice Information System), a countrywide network. But you can't pull out every kind of information easily; the problem is that the system is pretty rigid."

He explains: "Say I'm looking for a particular m.o. (modus operandi, or method the criminal used to commit the crime), like breaking into a private home by smashing the glass of a backyard window. I can't just input a particular m.o. into the CJIS computer and get out a list of suspects. Their system doesn't work that way."

So Mooseles decided he'd use local information to develop his own computer system. Using Superbase 64, a database program manufactured by Precision Software, Mooseles began designing his criminal database in late 1983. (His hardware peripherals included a Commodore 1541 disk drive, a Cardco printer interface and an Epson printer.)

On what kind of criminals did he decide to input data? Murderers? Rapists? "Those types of violent crimes don't happen here every day," he says. "A murder is a very *big* thing here. We don't need to computerize those; we *know* about them." He adds, "They're not usually repeat offenses, so we wouldn't have those people in the computer anyway."

How about other violent crimes? Says Mooseles, "Quite often, the victim can identify who raped or assaulted her. Or someone at the scene saw the assailant and can help us identify him." (In 1983, Melbourne had one murder and 21 rapes.)

Instead, Detective Mooseles decided to zero in and logically attack a growing problem in Melbourne: robberies and burglaries.

What's the difference between a rob-

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ber and a burglar? According to Mooseles, an example of a robber is someone who holds up a store, demanding the clerk hand over cash from the register. A burglar, however, is someone who sneaks into a home and steals your video recorder and the pearls Aunt Millie left your wife.

Last year, Melbourne residents were ripped off in 66 robberies and 940 breaking and entering (burglary) cases.

Play It Again...

The six and a half years Randy Mooseles has spent with the Melbourne Police Force (three as a detective) have convinced him that many criminals are repeat offenders, usually using the same m.o. every time they rob or steal.

"Most of the people I've arrested for burglary or robbery have done it before, and often I've been the one who did the arresting then, too," says Mooseles, ironically. So he knew he had data suited to computerization, which

Most of the people I've arrested for burglary or robbery have done it before, and I've often been the one who arrested them then.

he could use to look for patterns in nabbing the bad guys.

Wait a minute! What about any Lex Luthors (nemesis of Superman) or other master criminals, meticulously careful to employ devious little twists and plots in the course of their crimes so they'll throw off the good guys? "No," grins Mooseles. "Most criminals are pretty dumb."

Limiting his system solely to recidivists (repeat offenders) or people he seriously suspected, Mooseles began entering several types of data. Initially inputting about 120 names, he included physical descriptions of each person—height, weight, hair color, race, sex, birth date and address. Then he added information extracted from the police Narrative Report, on known m.o.s for each person. He also added the fingerprint data for every person previously arrested.

How could he type in the whorls and swirls of fingerprints without an incredibly specialized keyboard or graphics display? "Fingerprints are coded by a series of numbers or letters, one group for each finger," he explained.

The following is a sample print, with two characters or letters for each finger.

aa 11 12 10 03 aa aa 08 16 04

Mooseles explains further, "A lot of times we can get latent prints from the scene of the crime. Even if we can find just one fingerprint, and say we know it's the third finger of the guy's right hand, then the system will kick out everyone who matches, and we might find our man." (Or woman; they're equal enough to commit crimes, too!)

Of course, he could easily call up fingerprint information from the big computer systems available through his terminals—but then they wouldn't have all his many other variables.

Mooseles also included in his database the names of the detectives who last handled cases involving prior arrests. "We log in all our cases and then they're assigned to detectives," he said. "If someone in my database were arrested who'd been here before, I'd know right away who worked on that case, and I'd go ask that detective for more information."

Why didn't Detective Mooseles input drug crimes? After all, addicts should be very predictable, because of the nature of their physical need. "Oh, they're predictable," says Mooseles, "but it's not my field—Narcotics and Vice do that."

He added, "Actually, I *do* have drug abusers in my system. Many people who are heavy drug users don't legally make enough money to support their expensive habit, and they resort to stealing. So I've got them down under the category of burglary!"

Of Databases and Disk Drives

Is he happy with Superbase 64, his software? "It cost me 100 bucks," he grimaces. But he is extremely pleased with the flexibility of the program. "It was sure well worth the price. You can pull out as much or as little from it as you need.

"For example, I could say I want all white males with red hair who are taller than six feet. Or I could ask for all people in area 1 who are over 20 years old.

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Or who *are* 20 years old." His dot-matrix printer would then produce a neatly typed alphabetized list of possible suspects. (When he was finished with his program's design, it incorporated over 20 variables!)

Any problems? Oh yes! Not from the chief or his fellow detectives (they were a little wary at first, then admiring), but from a very uncooperative disk drive.

"It took me about 20 hours to type everything in," Mooseles frowns, remembering. (He did the work over several weeks off-duty, because he's constantly interrupted in the office. While I was interviewing him, the chief and several detectives dropped by with quick questions, the phone rang several times, and a thin, terrified-looking old man showed up to see him.)

"Twenty hours of typing, and I suddenly lost all my data!" he exclaimed in mock agony. What happened?

"I knew something was wrong because the light on the disk drive kept going off and on. But I didn't do anything until it was too late and I'd lost everything. Then I took it in to the experts and they discovered the problem—I needed my disk drive realigned!" (Ouch! That'll be $60, please.)

Most people would have thrown in the towel at that point, telling themselves it was just not meant to be, but not Randy Mooseles. He had the drive fixed, then rolled up his sleeves. "I did it all over again," he said.

Has the property crime rate plummeted in Melbourne since Detective Randy Mooseles began computerizing local crime records?

"Not yet," he admits. "But we're planning to relocate to newer, larger quarters in a few months, and we'll probably enlarge the system then."

Once the Melbourne Police Dept. is housed in the more spacious building, Mooseles hopes his chief will authorize him some help to input the more than 1000 names he thinks will make his system invaluable to the force. "But it'll never be finished," he says. "We'll always be adding new names to our list."

Mooseles is positive that police departments throughout the country could benefit by using micros. "They're getting cheaper and cheaper, and they're not hard to use," he says enthusiastically. "I definitely think police officers should use micros. They should have courses to teach them how to use them." (Mooseles, a college graduate in Criminal Justice, taught himself how to program in his spare time.)

Mooseles also can see the feasibility of adding violent crimes such as rape and murder to the databases of large cities, where it's more likely that repeat offenders of these crimes can be found. (And he's convinced that a file on drug abusers would be valuable, too.)

Any suggestions for interested police officers? "Make backup copies of your data!" he says vehemently. "If I didn't back up constantly, another bad disk drive problem could wipe out my whole directory!" (He shudders at that thought.)

Randy Mooseles doesn't play Jumpman anymore. Instead, he's found a fascinating and unique way to use a computer, one which could ultimately save Melbourne residents thousands, even millions, of dollars.

What does Mooseles think about all that? Former TV Police Detective Joe Friday would be proud of this dedicated detective's response. He simply shrugs, "It's no big deal. Just trying to make my job a little easier." R

Address all author correspondence to Christine Adamec, 1921 Ohio St., NE, Palm Bay, FL 32907.

Mooseles is positive that all police departments could benefit by using microcomputers.

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SIDAID

It Works While You Play

Here's a program that adds three commands to Basic, so you can make music with your Commodore 64 without dealing with data details.

By M. J. Clifford

RUN It Right

Commodore 64

Address all author correspondence to Marc J. Clifford, 2323 W. Bancroft St., Toledo, OH 43607.

The Commodore 64, with its built-in sound synthesizer, is capable of generating great music and sound effects. However, in Basic, the lack of commands to handle the SID chip makes sound generation quite a hassle.

There are 25 registers used for sound in the SID chip, and every note requires two bytes of frequency data. You must keep track of all the register addresses and consult a table for the frequency data. In order to do all of this properly, you really need a computer. Hmmm....

Well, in addition to being a sound synthesizer, the 64 is a computer; so why not let it take care of all the details for you?

The accompanying program allows the 64 to do just that. You need only one address and the computer does all the rest. This frees you to concentrate on the music and makes it much easier for you to experiment with different sound envelopes and so on.

Help Is Here

The program adds three commands to Basic: one to alter the voice's envelope, one to play a note for a specified time and one to turn off the volume when the sounds are finished. This is done by means of Basic's SYS command.

The SYS command transfers control to a machine language routine that reads the required values from the Basic program. These values are then put into the proper registers or used to find the frequency data from a table.

To use this program, you must first define three variables: QU for Quiet, AV for Alter Voice and PY for Play a note. You begin by setting QU equal to 40384, PY equal to QU + 3 and AV equal to QU + 6. Once this is done, the three new commands take the following form.

```
SYSAV,v,a,d,s,r,w(,pw)
SYSPY,v,p,t,vl
SYSQU
```

The values represented by lowercase letters may be constants, variables or expressions, and they represent the following.

v: voice (1–3)

a, d, s, r: attack, decay, sustain and release (0–15).

w: wave type—16 = triangle; 32 = sawtooth; 64 = pulse; and 128 = noise. 20 may be used for ring modulation and any of the values can be increased by 2 for synchronization with another voice.

pw: pulse width—used only with wavy type 64, the pulse wave, and may have values 0–4095.

p: pitch value—0–86, representing halftones from A# in octave 0 to B in octave 7 (see Table). 86 is a rest.

t: 0–255 (0 = 256) representing the approximate number of jiffies (⅙₀th second) until the note is stopped.

vl: volume—0–15.

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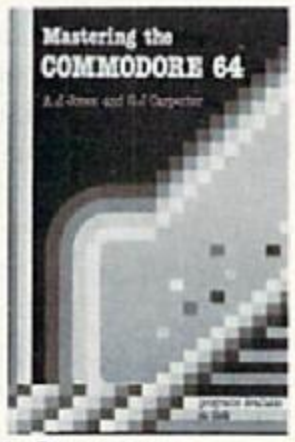

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Octave#	C	C#	D	D#	E	F	F#	G	G#	A	A#	B
							Notes					
0											0	1
1	2	3	4	5	6	7	8	9	10	11	12	13
2	14	15	16	17	18	19	20	21	22	23	24	25
3	26	27	28	29	30	31	32	33	34	35	36	37
4	38	39	40	41	42	43	44	45	46	47	48	49
5	50	51	52	53	54	55	56	57	58	59	60	61
6	62	63	64	65	66	67	68	69	70	71	72	73
7	74	75	76	77	78	79	80	81	82	83	84	85

Table of pitch values over seven octaves.

Examples

To set up voice 3 as a drum, enter:

```
SYSAV,3,0,9,0,9,128
```

This gives voice 3 an attack value of 0 and a decay value of 9 for a sound that reaches full volume immediately and falls off rather quickly to the sustain level, which is set to 0. The release is set to 9 to continue the decay if necessary. The waveform is set to 128, which is noise.

To produce the sound of fading footsteps using the above voice setting, enter:

```
FOR X = 15 TO 0 STEP -1:SYSPY,3,25,30,
    X:NEXT X
```

This plays voice 3 at pitch 25 for 30 jiffies. Because voice 3 has been given a sustain level of 0, the sound is the same for almost any time value. Thus, the 30 serves to control the time between sounds. The loop plays the sound 15 times with the volume decreasing each time from the maximum of 15 down to 0 as determined by the value of X.

To set up voice 1 as a piano, enter:

```
SYSAV,1,0,9,0,0,64,255
```

A piano has an envelope similar to a drum, but the 64 sets the waveform to a pulse wave with a pulse width of 255.

When no sounds are being produced and you wish to prevent any humming from the speaker, you may shut off the SID chip completely by entering:

```
SYSQU
```

The examples are given for use in a program where QU, AV and PY have the correct values. To use the commands in Direct mode, the actual addresses should be used. Thus, in Direct mode, SYSQU is SYS40384; SYSAV is SYS40390; and SYSPY is SYS40387.

The program in Listing 1 serves two purposes. It first Pokes the machine language into memory, then it saves it on disk or tape for faster loading in the future. Once this program is run, you'll need it only to put a copy of the SIDAID program on another disk or tape. To load the SIDAID program for use, enter:

```
LOAD"SIDCD",8,1 (,1,1 for tape)
POKE 52,157:POKE 56,157:NEW
```

The Poke commands lower the top of Basic's available memory by 768 bytes to protect the machine language from being overwritten by Basic. Once this is

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Listing 1. SIDAID loader program.

```
5 REM SIDAID.LOADER M J CLIFFORD
1Ø POKE52,157:POKE56,157:POKE51,192:POKE55,192:CLR
2Ø AD=4Ø384
3Ø FORL=1TO37:IFL=26THENL=27
4Ø FORX=ØTO15:READB:C=C+B:POKEAD+X,B:NEXT
5Ø READK:IFC<>KTHENPRINT"ERROR IN DATA IN LINE";1ØØØ+L:
   END
6Ø T=T+C:C=Ø:AD=AD+16:NEXTL
7Ø READK:IFT<>KTHENPRINT"ERROR IN DATA":END
8Ø QU=4Ø384:PY=QU+3:AV=QU+6
9Ø SYSPY,2,3Ø,3Ø,15:SYSQU
1ØØ PRINT"SID AID PACKAGE IS LOADED"
11Ø PRINT"SAVING M.L. PROGRAM{CRSR DN}"
2ØØ F$="SIDCD"
21Ø POKE187,PEEK(71):POKE188,PEEK(72)
22Ø FA=PEEK(187)+256*PEEK(188)
23Ø POKE183,PEEK(FA)
24Ø POKE187,PEEK(FA+1):POKE188,PEEK(FA+2)
25Ø POKE251,192:POKE252,157
26Ø POKE186,8:POKE185,1
27Ø POKE78Ø,251:POKE781,Ø:POKE782,16Ø
28Ø SYS65496
29Ø SYSPY,2,5Ø,3Ø,15:SYSQU
3ØØ PRINT"SID AID PACKAGE IS SAVED AS "F$
31Ø PRINT"{CRSR DN}NEXT TIME JUST ENTER:"
32Ø PRINT"LOAD"CHR$(34)F$CHR$(34)",8,1{2 CRSR DNs}"
1ØØØ REM *** SIDCD{2 SPACEs}DATA ***
1ØØ1 DATA 76,45,159,76,78,158,32,69,158,152,41,3,24Ø,97
     ,141,5Ø,1575
1ØØ2 DATA 158,2Ø6,5Ø,158,32,69,158,152,1Ø,1Ø,1Ø,1Ø,133,
     251,32,69,15Ø8
1ØØ3 DATA 158,152,41,15,5,251,133,251,32,69,158,1Ø,1Ø,1
     Ø,1Ø,133,1438
1ØØ4 DATA 253,32,69,158,152,41,15,5,253,133,253,32,69,1
     58,152,41,1816
1ØØ5 DATA 246,172,5Ø,158,153,57,158,9,1,153,66,158,165,
     253,153,54,2ØØ6
1ØØ6 DATA 158,165,251,153,51,158,185,57,158,41,64,24Ø,1
     7,32,69,158,1957
1ØØ7 DATA 72,173,5Ø,158,1Ø,17Ø,1Ø4,157,61,158,152,157,6
     Ø,158,96,1Ø8,1844
1ØØ8 DATA Ø,3,Ø,9,1Ø,9,3,3,9,64,64,128,Ø,4,Ø,4,31Ø
1ØØ9 DATA Ø,Ø,65,65,129,32,253,174,32,158,173,76,17Ø,17
     7,32,69,16Ø5
1Ø1Ø DATA 158,152,41,3,24Ø,33,141,5Ø,158,2Ø6,5Ø,158,32,
     69,158,132,1781
1Ø11 DATA 251,32,69,158,132,253,32,69,158,14Ø,24,212,17
     3,5Ø,158,24Ø,2151
1Ø12 DATA 11,74,176,62,76,232,158,162,14,1Ø8,Ø,3,173,51
     ,158,141,1599
1Ø13 DATA 5,212,173,54,158,141,6,212,173,6Ø,158,141,2,2
     12,173,61,1941
1Ø14 DATA 158,141,3,212,166,251,189,167,159,188,8Ø,159,
     141,Ø,212,14Ø,2366
1Ø15 DATA 1,212,173,66,158,141,4,212,32,3Ø,159,173,57,1
     58,141,4,1721
1Ø16 DATA 212,96,173,52,158,172,55,158,141,12,212,14Ø,1
     3,212,173,62,2Ø41
1Ø17 DATA 158,141,9,212,173,63,158,141,1Ø,212,166,251,1
     89,167,159,188,2397
1Ø18 DATA 8Ø,159,141,7,212,14Ø,8,212,173,67,158,141,11,
     212,32,3Ø,1783
1Ø19 DATA 159,173,58,158,141,11,212,96,173,53,158,172,5
     6,158,141,19,1938
```

More

done, the commands are available in Direct mode or a program using them may be entered or loaded and run. This operation can also be handled by a program using SIDAID if it begins with the following lines.

```
10 POKE 52,157:POKE 56,157:CLR
20 IF PEEK(40384) < > 76 THEN
   LOAD"SIDCD",8,1
30 QU = 40384:PY = QU + 3:AV = QU + 6
```

The test in line 20 is necessary, since a Load command issued by a Basic program causes the program to start over from the beginning once the program has been loaded. The test prevents the loading process from being executed over and over again and allows the program to continue once SIDCD is ready.

Listing 2 contains a short demonstration program that illustrates some of the things you can do with the package. Many more features are possible, and this package makes it a lot easier to experiment. Two of the features demonstrated in this program, synchronization and ring modulation, may require further explanation.

Synchronization is the use of the And command to merge two waveforms, causing the volume to fluctuate as the two waves reinforce or interfere with each other. This feature is activated by adding 2 to the waveform value used in the SYSAV command.

If synchronization is used for voice 1, voice 3 must be set to some frequency other than 0 but preferably lower than that of voice 1. No other parameter of voice 3 has any effect. When synchronization is activated for voice 2, this voice is synchronized with the pitch of voice 1. Voice 3 is synchronized with voice 2.

Ring modulation is activated by using a waveform value of 20 in the SYSAV command. This produces bell- or gong-like sounds. As with synchronization, ring modulation of voice 1 requires that voice 3 be set to some lower pitch value. Voice 2 is modulated by voice 1 and voice 3 is modulated by the pitch value in voice 2. The quality of the sound depends in part on the difference in pitch between the sounding voice and the modulating voice.

Description of Loader

Lines 10–20: Protect the machine language from Basic and set the beginning address.

Lines 30–70: Read the data from lines

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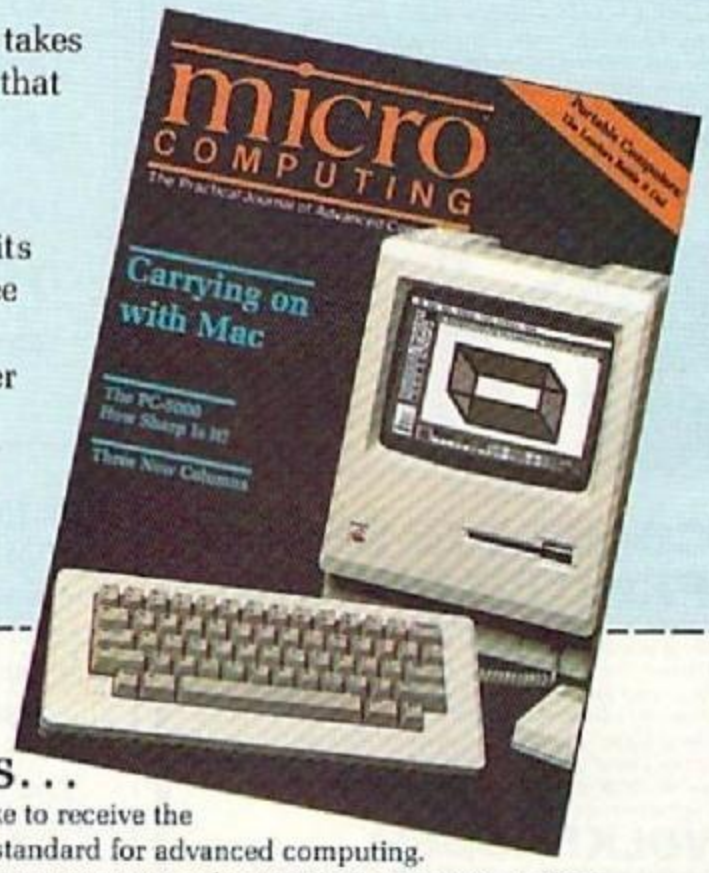

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Listing 1 continued.

```
1020 DATA 212,140,20,212,173,64,158,141,16,212,173,65,1
     58,141,17,212,2114
1021 DATA 166,251,189,167,159,188,80,159,141,14,212,140
     ,15,212,173,68,2334
1022 DATA 158,141,18,212,32,30,159,173,59,158,141,18,21
     2,96,160,0,1767
1023 DATA 162,10,136,208,253,202,208,250,198,253,208,24
     4,96,169,0,141,2738
1024 DATA 24,212,141,4,212,141,11,212,141,18,212,96,0,1
     41,24,212,1801
1025 DATA 141,4,212,141,11,212,141,18,212,96,255,255,25
     5,255,255,255,2718
1026 REM ***FREQUENCY DATA HI LO***
1027 DATA 1,1,2,2,2,2,2,2,2,3,3,3,3,3,4,4,39
1028 DATA 4,4,5,5,5,6,6,6,7,7,8,8,9,9,10,10,109
1029 DATA 11,12,12,13,14,15,16,17,18,19,20,21,22,24,25,
     27,286
1030 DATA 28,30,32,34,36,38,40,43,45,48,51,54,57,61,64,
     68,729
1031 DATA 72,76,81,86,91,96,102,108,115,122,129,137,145
     ,153,163,172,1848
1032 DATA 183,193,205,217,230,244,0,205,233,6,37,69,104
     ,140,179,220,2465
1033 DATA 8,54,103,155,210,12,73,139,208,25,103,185,16,
     108,206,53,1658
1034 DATA 163,23,147,21,159,50,205,114,32,216,156,107,7
     0,47,37,42,1589
1035 DATA 63,100,154,227,63,177,56,214,141,94,75,85,126
     ,200,52,198,2025
1036 DATA 127,97,111,172,126,188,149,169,252,161,105,14
     0,254,194,223,88,2556
1037 DATA 52,120,43,83,247,31,210,25,252,133,189,176,10
     3,0,0,0,1664,62217
```

1001–1037, skipping line 1026, which is a REM. The last number on each data line is a checksum. If you make a mistake in entering the data, the program will halt and report the line number of the data on which the error occurred.

Lines 80–100: Signal the successful loading of the program.

Lines 200–280: Use the Kernal's Save routine to save the machine language in a program file that can be loaded directly with LOAD"SIDCD",8,1 from disk or LOAD"SIDCD",1,1 from cassette.

Line 200: Sets F$ equal to program name.

Lines 210–220: Find the location of F$ in memory.

Lines 230–240: Poke the length and address of F$ to the place where the Kernal expects to find them.

Line 250: Pokes the starting address into available zero-page memory.

Line 260: Pokes device number and secondary address to Kernal—change the 8 to a 1 for tape.

Line 270: Pokes the location of starting address and the low and high parts of the ending address to the Kernal.

Line 280: Calls the Save routine.

Lines 290–320: Signal that the job is done. For cassette, change the 8 in line 320 to a 1.

Description of the Demo

Lines 10–30: Load and initialize SIDCD.

Line 50: Sets up voice 1 with attack 0, decay 0, sustain 15, release 3 and triangle waveform.

Line 60: Plays a run of notes with this voice using the loop counter as the pitch.

Line 80: Sets up voice 2 with the same ADSR envelope as voice 1, but with a pulse wave having a pulse width of 100.

Line 90: Plays a run of notes with this voice.

Line 110: Plays a run of notes using voice 3's default parameters (noise).

Lines 130–160: Play a scale using voice 1 and then voice 2. The pitch values are in the array S( ).

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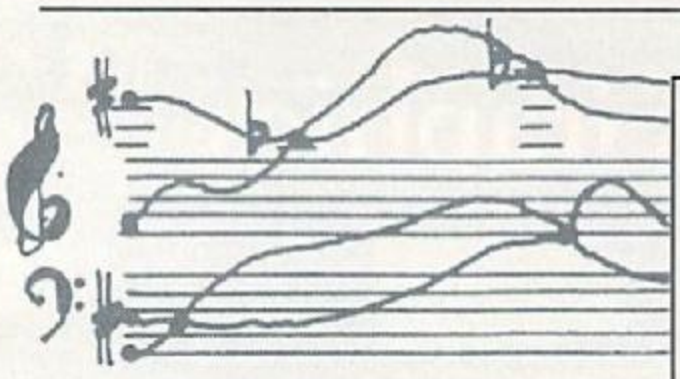

Line 170: Plays voice 3 for one second at 0 volume—a timed delay.

Lines 180–270: Play a short tune stored in the arrays T1( ) and D1( ) on different instruments.

Lines 300–410: Sound effects.

Line 330: Gunshot or explosion sound—starts loud and rapidly drops in volume. Pitch 45 is good for a gun; try different pitches for different kinds of explosions.

Lines 340–375: The rising and falling volumes of a mosquito buzz are caused by synchronizing voice 1 with voice 3. The waveform value of 18 is 16 for triangle plus 2 for synchronization. Line 360 enters a pitch value of 48 into voice 3, but at 0 volume, so that no sound is heard. Line 370 sounds voice 1 with a pitch of 70. The volume rises and falls as the frequencies of the two voices alternately reinforce and interfere with each other. The effect changes if the difference between the two pitch values is changed. Synchronization can also be used with the other waveforms.

Lines 380–410: The bell-like quality is caused by ring modulation of the triangle waveform using a value of 20, which is a 16 for triangle plus 4 for ring. As with sync, a pitch is put in voice 3 and the effect produced depends on the difference between the pitch values of the two voices.

Lines 500–540: Subroutine to play a tune, using the pitch and time values in the arrays T1( ) and D1( ). The time values are multipled by a tempo value, T, so that the length of the notes can be changed by simply changing T, as was done in lines 190 and 220.

Lines 1000–1030: Initialization or setting up of program.

Line 1010: Reads the data from line 1040 into array S( ). The values given are for a scale in the key of C, beginning at middle C. The 86 is the value for a rest.

Line 1020: Reads the pitch and time values for a short tune into the T1( ) and D1( ) arrays.

Line 1030: Initializes the SID chip by Poking a 0 into all the registers. R

Listing 2. Demonstration of SIDAID program.

```
5 REM SIDAID DEMONSTRATION
1Ø POKE52,157:POKE56,157:CLR
2Ø IF PEEK(4Ø384) <>76 THEN LOAD"SIDCD",8,1
3Ø QU=4Ø384:PY=QU+3:AV=QU+6
4Ø GOSUB1ØØØ:REM SETTING UP
5Ø SYSAV,1,Ø,1Ø,15,3,16
6Ø FORX=9TO79STEP2:SYSPY,1,X,5,15:NEXT
7Ø SYSQU
8Ø SYSAV,2,Ø,1Ø,15,3,64,1ØØ
9Ø FORX=2ØTO6Ø:SYSPY,2,X,5,15:NEXT
1ØØ SYSQU
11Ø FORX=35TO5Ø:SYSPY,3,X,1Ø,15:NEXT
12Ø SYSQU
13Ø FORV=1TO2
14Ø FORX=1TO8:SYSPY,V,S(X),25,15:NEXT
15Ø FORX=8TO1STEP-1:SYSPY,V,S(X),15,15:NEXT
16Ø NEXTV:SYSQU
17Ø SYSPY,3,86,6Ø,Ø
18Ø REM PLAY A TUNE ON DIFFERENT INSTRUMENTS
19Ø T=6
2ØØ SYSAV,1,Ø,9,Ø,Ø,64,255:REM PIANO
2Ø5 GOSUB5ØØ
21Ø SYSAV,1,Ø,9,Ø,Ø,64,63:REM BANJO
22Ø GOSUB5ØØ:T=4
24Ø SYSAV,1,6,5,2,2,32:REM ACCORDIAN
25Ø GOSUB5ØØ
26Ø SYSAV,1,6,Ø,1Ø,1,32:REM TRUMPET
27Ø GOSUB5ØØ
3ØØ REM SOUND EFFECTS
31Ø REM GUNSHOTS
32Ø FOR Z=1TO3
33Ø FORX=15TOØSTEP-1:SYSPY,3,45,1,X:NEXT:NEXT:SYSQU
34Ø REM MOSQUITO USING SYNCHONIZATION
35Ø SYSAV,1,13,11,Ø,Ø,18
36Ø SYSPY,3,48,1Ø,Ø:REM SYNC ONLY
37Ø FORX=1TO5:SYSPY,1,7Ø,2ØØ,15:NEXT
375 SYSQU
38Ø REM CHIMES USING RING MODULATION
39Ø SYSAV,1,Ø,9,Ø,Ø,2Ø
395 SYSPY,3,5Ø,1Ø,Ø
4ØØ FORX=1TO12:SYSPY,1,74,16Ø,15:NEXT
41Ø SYSQU
499 END
5ØØ REM PLAY A TUNE
52Ø FORX=1TO21:SYSPY,1,T1(X),D1(X)*T,15:NEXT
53Ø SYSQU
54Ø RETURN
999 END
1ØØØ DIM S(8),T1(21),D1(21)
1Ø1Ø FORX=ØTO8:READS(X):NEXTX:REM SCALE
1Ø2Ø FORX=1TO21:READT1(X),D1(X):NEXT
1Ø3Ø FORX=54272TO54296:POKEX,Ø:NEXT
1Ø35 RETURN
1Ø39 REM C-SCALE
1Ø4Ø DATA 86,38,4Ø,42,43,45,47,49,5Ø
1Ø49 REM TUNE
1Ø5Ø DATA 45,4,47,4,45,4,45,4,45,2,47,2,49,12,45,4,47,4
     ,4Ø,4,4Ø,4,4Ø,4,4Ø,4
1Ø55 DATA 42,1,43,1,45,4,43,2,4Ø,8,38,12,86,12,5Ø,12
```


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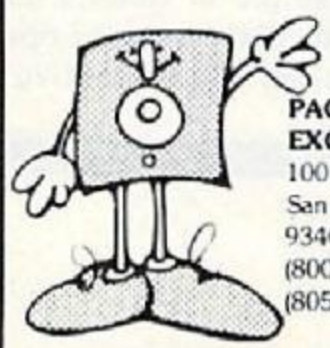

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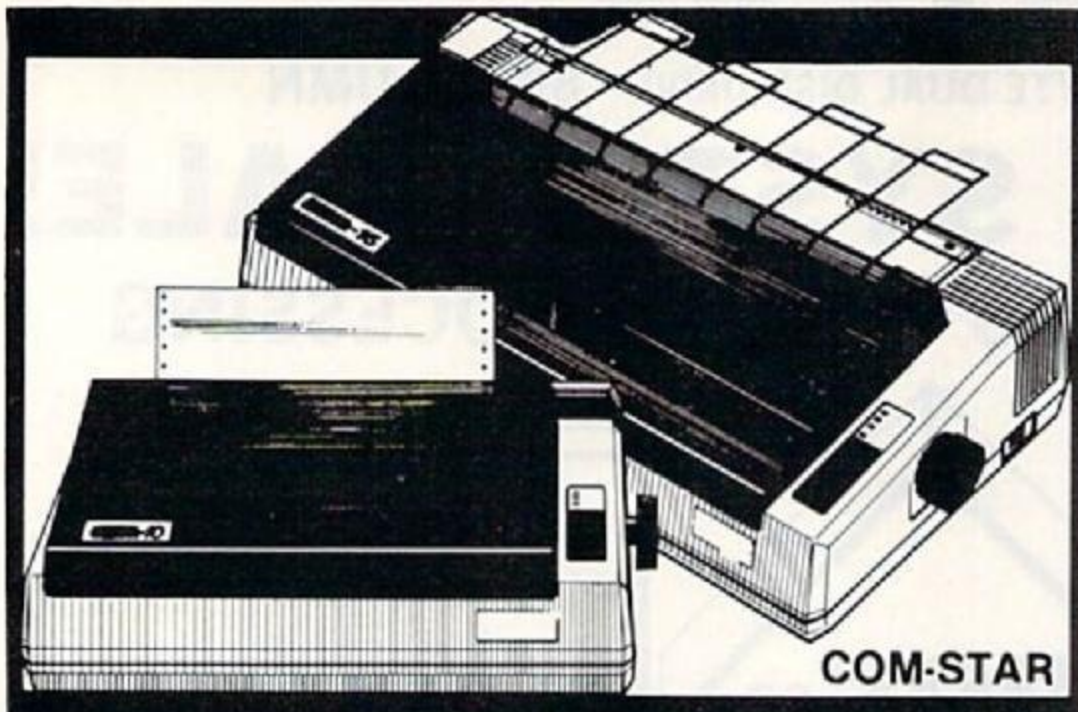

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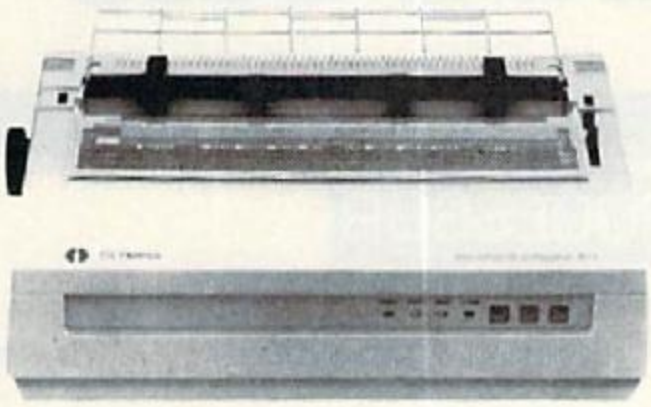

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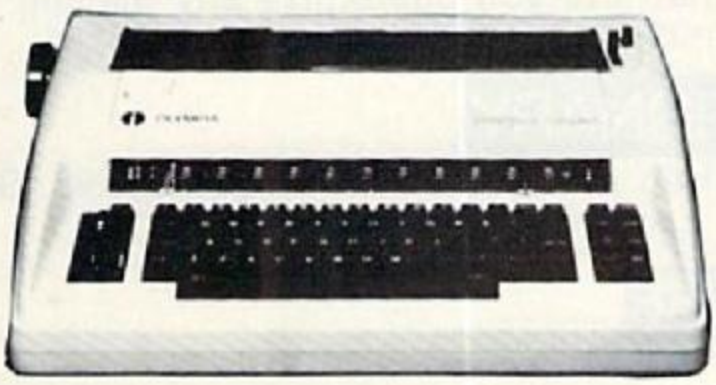

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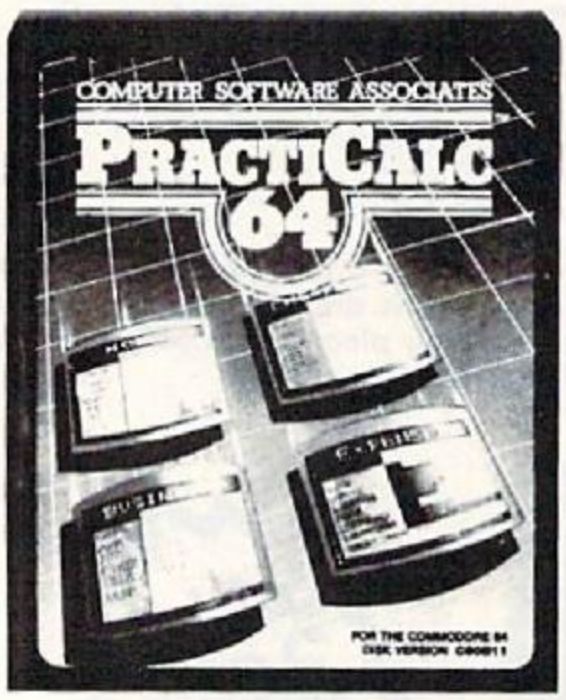

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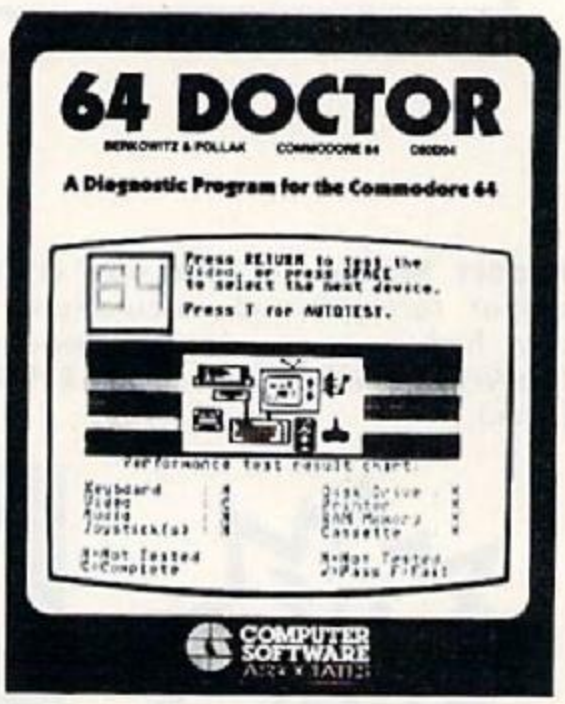

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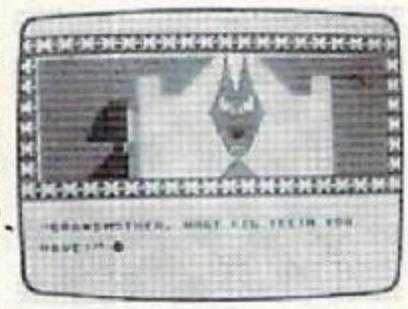

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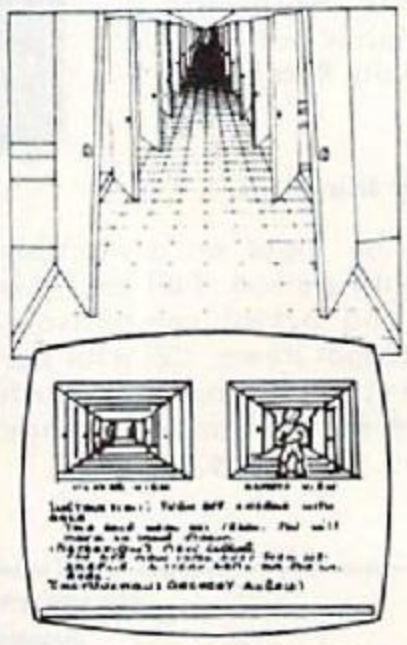

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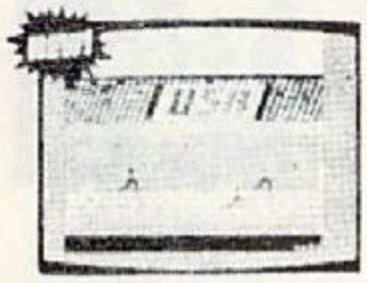

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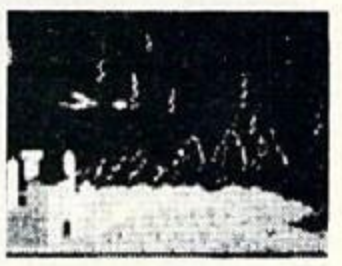

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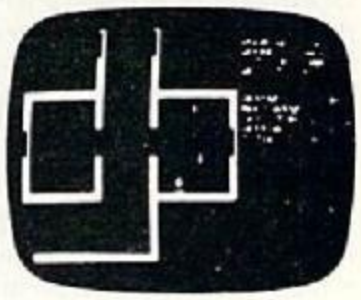

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Magic (from p. 10)

gize the wedge, enter SYS52224, then type @#8 [return].

Other problems with Datassette errors can usually be eliminated by cleaning and demagnetizing your recorder heads, and/or by using a bulk eraser on your cassettes.

Adam Szymczak
Brantford, Ontario
Canada

$DE Cassette labels—Every stationery store sells ⅝- × 3½-inch file-folder labels, which work very well with Datassette tapes. I put one on each side of my cassettes and on the edge of my hard plastic storage boxes. The labels are available in white and with color-coded stripes. A packet of 248 costs around $3.

Maureen Swanson
Kitimat, British Columbia
Canada

$DF Easy disk loads—Loading a program from the 1541 disk drive can be made simpler in many cases by using the program's directory entry. List the directory to the screen, then move your cursor to the desired program. Type in an abbreviated Load command (L shift O) and a comma 8, obliterate PRG, then press the return key. Your program will load immediately. Here is a sample directory load.

```
L(shifted O) "Filename",8(spaces over the PRG) (return)
```

If the program is in machine language and you use a non-relocating secondary command, the following example avoids a syntax error.

```
L(shifted O) "Filename",8,1 (return) PRG
```

If the program is in Basic, use the following example to avoid a syntax error and having to space over the PRG.

```
L(shifted O) "Filename",8: (return) PRG
```

Chris Johnson
Clearbrook, British Columbia
Canada

$E0 Disk disaster prevention—If there is an asterisk to the right of a filename on your disk directory, that file is corrupt and should be removed from the disk. But *don't* scratch it, or you may be courting disaster.

Instead, do a disk validation, which will remove the corrupt file. If you're using the wedge program, @V will validate your disk. Otherwise, enter the following.

```
OPEN15,8,15,"V":CLOSE15
```

Robert A. Adler
Montreal, Quebec
Canada

$E1 Disk error detection—If the red LED on your disk drive starts flashing, some sort of disk error has occurred, and you can easily tell which error it is. While the light is flashing, add the following line to your program.

```
0 OPEN15,8,15:INPUT#15,A,B$:PRINTA,B$:CLOSE15:END
```

Then run the program. The LED will go out and the error number, with a brief description, will be printed on the screen.

Complete explanations of each error number appear on pp. 43–46 of your *1541 User's Manual*. By the way, this method won't work in Direct mode, since the Input# command can only be used from inside a program.

R.A.A.

$E2 Mnumber mnemonic—When Poking to the C-64 screen, you usually Poke color memory as well. If you remember that the C-64's SID chip starts at memory location 54272, you need not memorize the starting location of color memory, which is 1024 locations higher, and you need not calculate any offsets to this start.

Just add 54272 to whatever screen location you're Poking, then Poke the desired color there. For example, POKE 1600,1 will put an A in the approximate center of your screen. In some C-64s, it will be visible, but in others it won't, because its color is the same as the screen color. In either case, you can change its color to white by entering:

```
POKE 1600+54272,1
```

R.A.A.

$E3 VIC downward scrolling—To scroll the VIC-20's screen downward, enter the following.

```
PRINT"{HOME}{CRSR DN}{CRSR LF}{INSERT}":POKE 218,158
```

Each time it's executed, the entire screen, *except the top line,* scrolls downward one line.

Of course, the technique is best used in Program mode. You can execute the trick code as many times as you want, scrolling down one more line each time. Here's an elegant example of the trick in use.

```
10 PRINT "{SHIFT CLR}"
20 PRINT "THE LADDER OF SUCCESS"
30 FOR I=1 TO 20 : PRINT "{HOME}{CRSR DN}{CRSR LF}
   {INSERT}":POKE 218,158 : NEXT
40 FOR I=1 TO 20 : PRINT : NEXT : FOR I=1 TO 20 : PRINT :
   FOR J=1 TO 200 : NEXT J,I
50 GOTO 10
```

This trick also works on the C-64, but with bugs. Can anyone figure out a bug-free version?

Harold J. Wallace, Jr.
Macclenny, FL

$E4 Abbreviations—You probably already know that Commodore Basic lets you enter most keywords by pressing the first letter of the keyword then shifting the second letter. But if somebody told you that this is a good way to save memory space, then please tell them to catch the next serial bus out of town.

The Basic abbreviations are a convenient way of entering programs from the keyboard, since they require fewer keystrokes than typing out the whole word. Sometimes, they also allow you to squeeze more information into a single program line, which is generally limited to four screen lines on the VIC and two screen lines on the 64.

However, the abbreviations *do not* save memory space in the computer. When Basic receives a program line, Basic automatically converts keywords into single characters, called tokens.

For example, the token for the Print statement is 153, which is stored in one byte of memory. Regardless of whether you type PRINT (5 characters) or ? (1 character),

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the resulting program line will always store the instruction as one character. Thus, unfortunately, there is no saving of memory space.

And speaking of abbreviations, please remember that you cannot use a question mark in abbreviating PRINT#. The latter command is used when you want to send information to a peripheral such as a disk drive, Datassette or printer, and must specify a file number. The correct abbreviation for the Print# statement is P(shift R), which Basic stores as token number 152.

If you try to abbreviate Print# as ?#, it will be tokenized as 153 (the token for Print), followed by a 35 (the code for #). That will yield a syntax error instead of the desired result.

There is one sneaky way around this restriction—simply type the program line using ?# and press the return key. Next, list that line, move the cursor back up to it and press the return key again. The second time, the Print# statement will be spelled out in full, and will be properly tokenized.

You also have to be careful with the Get, Get#, Input and Input# statements. Get# and Input# are used to obtain data from peripherals, much as Print# sends information to them. The Get statement is abbreviated G (shift E), but that abbreviation cannot be used for GET#. GET# has no abbreviation.

Surprisingly, the commonly used Input statement also has no abbreviation, but the rarely used Input# statement is abbreviated as I (shift N).

Ian Adam
Vancouver, British Columbia
Canada

$E5 INTformation—Trick $69 (*RUN*, June 1984) informed us that some statements and functions automatically perform an INT function before further processing. A little simple experimentation indicates that truncating to an integer is automatic in at least the following cases, and possibly others.

Array Subscripts	MID$
CHR$	PEEK
DIM	POKE
GOSUB	RIGHT$
GOTO	SPC
LEFT$	TAB

I.A.

$E6 The On statement—One of the most underutilized Basic words is ON. This simple little statement can be used to make multiple-choice branching decisions. How often have you seen a program that suffers from a long list of conditional branches, such as:

```
10 GET A$:IFA$=""" THEN GOTO 10
20 IF A$ = "A" THEN GOTO 1000
30 IF A$ = "B" THEN GOTO 1100
40 IF A$ = "C" THEN GOTO 1150
50 Etc, etc, etc.
```

All of this can be greatly simplified by using one appropriate test:

```
10 GET A$:IFA$=""" THEN GOTO 10
20 ON ASC( A$ ) - 64 GOTO 1000, 1100, 1150, etc., etc.: GOTO 10
```

If A$ is not one of the letters specified, then the first GOTO command will be ignored.

There are many other ways to use the On statement. The only restrictions are that the expression being tested cannot be a negative number, nor a positive number greater than 255. Either of these conditions will generate an error message.

I.A.

$E7 Somewhat-random numbers—When you need a quick random integer that doesn't have to be perfectly random, a simpler and faster way than using the RND function is to look at the system clock. You can replace:

```
X = INT(256 * RND(-1))
```

with:

```
X = PEEK(162)
```

This yields an integer value ranging from 0 to 255. It isn't perfectly random, since it cycles from 0 up to 255 every four seconds, but it's fine for a quick random guess.

If you need a smaller integer, say from 0 to 15, you can use a Boolean operator:

```
X = PEEK(162) AND 15
```

If you want only even numbers, you can use:

```
X = PEEK(162) AND 254
```

Some combinations will work better than others, so experiment!

I.A.

$E8 Debugging hint—If you have a program that contains a lot of Data statements and you are reading from these and Poking to other locations, neglecting a comma can mean an Illegal Quantity error. Instead of searching through these statements to find the incorrect one, you may use the data line number locations to locate the bad line. Simply type:

```
PRINT PEEK(64)*256+PEEK(63)
```

The computer will respond with the line number of the illegal Data statement. This is much easier than searching through all the data.

Andy Bonham
Kingston, Ontario
Canada

$E9 Joystick substitute—If you have a C-64 but no joysticks, you can simulate joystick operation from the keyboard. It's not the most convenient thing in the world, but it *does* work.

PORT 1	PORT 2
Fire—space bar	space plus M key
Up—1 key	space plus f1
Down—left arrow	space plus Z key
Left—CTRL	space plus C key
Right—2 key	space plus B key

Fred Exelby
Brantford, Ontario
Canada

$EA VIC memory saver—If you wish to add instructions to a program that uses up all of the available memory in your VIC, then make the instructions a separate

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program by adding the following line to the end of the instructions.

```
1000 POKE198,1:POKE631,131:NEW
```

Now save the instruction program to tape, followed by your regular program. This one line will load and run your second program and clear out the instructions.

Larry Mudge
Winnipeg, Manitoba
Canada

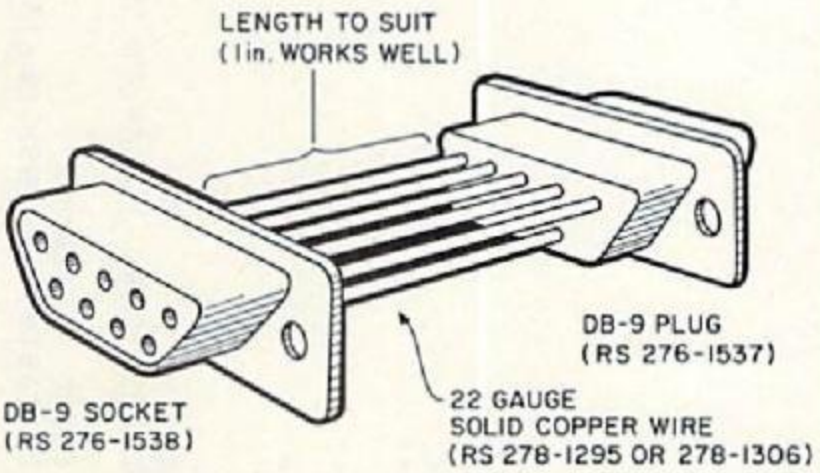
$EB More on connectors—There's a minor problem in using a hood on a control port connector...the edges of the hood may prevent the connector from being pushed all the way into the port, and will also interfere with any connector in the other control port.

Trimming the edges means that the hood won't be held securely to the connector, and not using a hood at all is bad practice because of the possibility of shorting the exposed contacts. Furthermore, the hood acts as a form of strain relief, helping to keep the wires from being pulled out of the connector.

I have found two solutions: the first involves building a stand-off, as illustrated below; the other solution utilizes newly available insulation displacement connectors and ribbon cable. Amphenol makes the connectors; they are very narrow, so there's no fouling, and they have built-in strain reliefs and don't need to be soldered.

For expansion port connectors, I previously used a Radio Shack pc board, which had 50 edge connectors on each end. I cut them down to 44 fingers with a small X-Acto saw. Unfortunately, this item has been discontinued, so now I've been etching my own, using Radio Shack's direct-etch dry transfers (276-1577) and double-sided copper-clad board. It's fast, easy and a lot cheaper.

John Kula
Victoria, British Columbia
Canada



THE WIRE IS A SNUG FIT INTO THE SOLDER CUPS ON THE CONNECTORS. I THEN USED LIQUID RUBBER (AVAILABLE FROM PLASTIC SHOPS) TO SURROUND THE WIRES CONNECTING THE SOCKET AND PLUG.

$EC Word trick—The secret in last month's work trick is in the initial letters of words in the target sentence. Knowing the secret, the clues are self-evident.

There's no word trick this month, but October's is a real illyday.

L.F.S.

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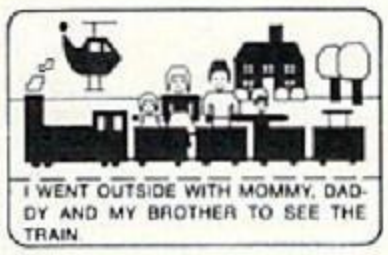

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(from p. 25)

```
37Ø GOSUB 9ØØ
38Ø I=INT(RND(1)*999)
39Ø POKE CHAR+I,81
4ØØ POKE CHAR+I+DF,1
41Ø FOR J=1 TO DLAY:NEXTJ
42Ø DLAY=DLAY-6
43Ø IF DELTA<>-4Ø GOTO 46Ø
44Ø PLANE=113:IF B1+DELTA<B THEN DELTA=Ø
45Ø GOTO 55Ø
46Ø IF DELTA<>4Ø GOTO 49Ø
47Ø PLANE=114:IF B1+DELTA>E THEN DELTA=Ø
48Ø GOTO 55Ø
49Ø IF DELTA<>-1 GOTO 52Ø
5ØØ PLANE=115:IF B1+DELTA<B THEN DELTA=Ø
51Ø GOTO 55Ø
52Ø IF DELTA<>1 GOTO 55Ø
53Ø PLANE=1Ø7:IF B1+DELTA>E THEN DELTA=Ø
54Ø GOTO 55Ø
55Ø B1=B1+DELTA
56Ø IF PEEK(B1)<>32 GOTO 69Ø
57Ø POKE B1,PLANE
58Ø POKE B1+DF,Ø
59Ø POKE B1-DELTA,32
6ØØ POKE B1+DF-DELTA,2
61Ø GOTO 36Ø
62Ø JV=PEEK(5632Ø)
63Ø FR=JVAND16
64Ø JV=15-(JVAND15)
65Ø TA=JV(JV)
66Ø IF TA=Ø THEN RETURN
67Ø DELTA=TA
68Ø RETURN
69Ø FOR N=1 TO 5Ø
7ØØ POKE VCE,4Ø
71Ø POKE VOLUME,15
72Ø POKE B1+DF-DELTA,Ø
73Ø POKE B1+DF-DELTA,1
74Ø POKE B1+DF-DELTA,2
75Ø POKE VCE,Ø
76Ø POKE VOLUME,Ø
77Ø NEXT N
78Ø PRINT"{SHFT CLR}"
79Ø FSH=TI
8ØØ ET=(FSH-BEGN)/6Ø
81Ø ET=INT(ET*1ØØ)/1ØØ
82Ø PRINTTAB(1Ø);"{CTRL 9}{CTRL 3}ELAPSED TIME:{2 CRSR
   DNs}"
83Ø PRINTTAB(8)ET;" {CTRL 9}SECONDS"
84Ø IF HS<ET THEN PRINTTAB(8)"{2 CRSR DNs}NEW HIGH SCOR
   E!!":HS=ET
85Ø FOR N=1 TO 1ØØØ
86Ø NEXT N
87Ø PRINT"{SHFT CLR}"
88Ø PLANE=1Ø7
89Ø GOTO 31Ø
9ØØ POKE VOLUME,15
91Ø POKE VCE,32
92Ø POKE VOLUME,Ø
93Ø RETURN
```

Listing 2. Sky Pilot program for the VIC-20.

```
1Ø REM **************
2Ø REM *{11 SPACEs}*
3Ø REM * SKY PILOT *
4Ø REM *{11 SPACEs}*
5Ø REM **************
6Ø PRINT"{SHFT CLR}"
7Ø PRINTTAB(4)"{2 CRSR DNs}{CTRL 9}{CTRL 3}SKY PILOT{CT
   RL 7}{2 CRSR DNs}"
8Ø PRINTTAB(2)"USE JOYSTICKS"
9Ø PRINTTAB(2)"TO AVOID HITTING "
1ØØ PRINTTAB(2)"CLOUDS.{2 SPACEs}GAIN"
11Ø PRINTTAB(2)"POINTS FOR EACH"
12Ø PRINTTAB(2)"SECOND YOU STAY"
13Ø PRINT"{2 SPACEs}ALIVE!"
14Ø PRINT"{2 CRSR DNs}{4 SPACEs}{CTRL 9}HIT ANY KEY"
15Ø GET A$:IF A$=""GOTO 15Ø
16Ø POKE 36879,234
17Ø PRINT"{SHFT CLR}"
18Ø PLANE=1Ø7
19Ø CSCREEN=37888+4*(PEEK(36866)AND128)
2ØØ CHAR=4*(PEEK(36866)AND128)+64*(PEEK(36869)AND12Ø):B
   =CHAR:E=CHAR+484
21Ø DF=CSCREEN-CHAR
22Ø DD=37154
23Ø PA=37137
24Ø PB=37152
25Ø DELTA=1
26Ø F=INT(RND(1)*21)
27Ø DLAY=2ØØ
28Ø B1=(CHAR+F*22)-1
29Ø BEGN=TI
3ØØ GOSUB 56Ø
31Ø GOSUB 84Ø
32Ø I=INT(RND(1)*484)
33Ø POKE CHAR+I,81
34Ø POKE CHAR+I+DF,1
35Ø FOR J=1TODLAY:NEXTJ
36Ø DLAY=DLAY-6
37Ø IF SØ<>-1 GOTO 4ØØ
38Ø DELTA=-22:PLANE=113:IF B1+DELTA<B THEN DELTA=Ø
```

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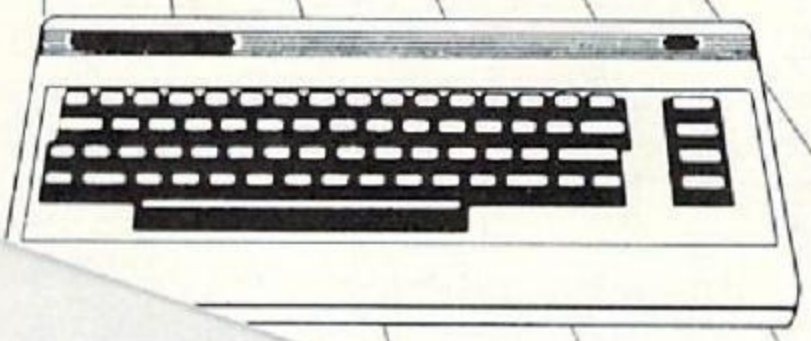

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Listing 2 continued.

```
  39Ø GOTO 49Ø
  4ØØ IF S1<>1 GOTO 43Ø
  41Ø DELTA=22:PLANE=114:IF B1+DELTA>E THEN DELTA=Ø
  42Ø GOTO 49Ø
  43Ø IF S2<>-1 GOTO 46Ø
  44Ø DELTA=-1:PLANE=115:IF B1+DELTA<B THEN DELTA=Ø
  45Ø GOTO 49Ø
  46Ø IF S3<>1 GOTO 49Ø
  47Ø DELTA=1:PLANE=1Ø7:IF B1+DELTA>E THEN DELTA=Ø
  48Ø GOTO 49Ø
  49Ø B1=B1+DELTA
  5ØØ IF PEEK(B1)<>32 GOTO 65Ø
  51Ø POKE B1,PLANE
  52Ø POKE B1+DF,Ø
  53Ø POKE B1-DELTA,32
  54Ø POKE B1+DF-DELTA,2
  55Ø GOTO 3ØØ
  56Ø POKE DD,127
  57Ø S3=-((PEEK(PB)AND 128)=Ø)
  58Ø POKE DD,255
  59Ø P=PEEK(PA)
  6ØØ S1=-((PAND8)=Ø)
  61Ø S2=((PAND16)=Ø)
  62Ø SØ=((PAND4)=Ø)
  63Ø FR=-((PAND32)=Ø)
  64Ø RETURN
  65Ø FOR N=1 TO 5Ø
  66Ø POKE 36877,2ØØ
  67Ø POKE B1+DF-DELTA,Ø
  68Ø POKE B1+DF-DELTA,1
  69Ø POKE B1+DF-DELTA,2
  7ØØ POKE 36877,Ø
  71Ø NEXT N
  72Ø PRINT"{SHFT CLR}"
  73Ø FSH=TI
  74Ø ET=(FSH-BEGN)/6Ø
  75Ø ET=INT(ET*1ØØ)/1ØØ
  76Ø PRINTTAB(4);"{CTRL 9}{CTRL 3}ELAPSED TIME:{2 CRSR D
     Ns}"
  77Ø PRINT ET;" {CTRL 9}SECONDS"
  78Ø IF HS<ET THEN PRINT"{2 CRSR DNs} NEW HIGH SCORE!!":
     HS=ET
  79Ø FOR N=1 TO 1ØØØ
  8ØØ NEXT N
  81Ø PRINT"{SHFT CLR}"
  82Ø PLANE=1Ø7
  83Ø GOTO 25Ø
  84Ø POKE 36878,15
  85Ø POKE 36874,2ØØ
  86Ø POKE 36874,Ø
  87Ø RETURN
```


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The Mail RUN

Comal Is Coming

Last night at a meeting of our C-64 user's group, there was considerable favorable comment on the development of *RUN* into a first-class magazine.

Our group would like to suggest that you print articles on Comal, for many of us are interested in this language. It's ideal for people who want to be self-taught, good and versatile program writers, particularly on a 64K computer.

Macey B. McKee
Macomb, IL

Watch for next month's issue on languages, which includes coverage of Comal.

Editors

Relatively Speaking

Congratulations and sincerest thanks to *RUN* and Mr. David Brooks for your fine three-part series on relative files ("Relatively Speaking," *RUN*, April-June 1984). I had previously searched for this kind of information in the libraries and bookstores in this town, but to no avail.

Also, that someone else considers the 1541 manual to be "vague, error-filled and misleading" soothes the soul. Thanks.

However, in part 3 of this series, Mr. Brooks says, "I'm assuming that you understand how to read and write relative files." For me, that's certainly a far cry from the truth. I must also believe that I have an awful lot of company among your vast readership!

At any rate, I feel that if the interest of the series truly was to "encourage you to develop this program into something that fits your specific needs," I must believe that the majority of us out here in computerland would appreciate and benefit from a continuation of this fine series, if you get more fundamental in its structure. I mean, start at square one!

Perhaps you could develop a less complex program that uses the keyword search feature, but you could build it up a line at a time. Follow this up with a comprehensive article that explains and illustrates how to modify and expand the program using examples, not just the cursory comments such as appear at the end of part 3 of the series.

Many thanks and keep up the fine work.

Don Gasquoine
Stockton, CA

Many others agreed with you that the articles on relative files were confusing, and just as many mentioned that they also found random access and sequential files confusing. Therefore, we plan to run more articles dealing with all three types of files.

Editors

The Commodore Epic

A power surge burned its way through our Commodore 64 computer on Sunday, May 27. A friend confirmed that the damage was major and panic ensued. Several days and many phone calls later, we learned of a rumor that Commodore had an exchange policy of some kind; however, no one seemed sure of the details.

Happily, at this point, we spotted *RUN*'s June issue and the article, "The 91st Day." We were particularly pleased to note that the author received his new unit in only two weeks.

On Monday, June 11th, we wrapped up the 64, an explanatory note and a check for $55, and we mailed them to Commodore. *Two days later*, we received our new 64 and accompanying materials. We thought that this fine service should be brought to the attention of our fellow *RUN* readers. Thank you for an informative and timely article.

Mr. and Mrs. Richard E. Rich
Indianapolis, IN

I want to tell you how much I enjoyed Mr. Wright's article, "The 91st Day." His story dealt with the C-64 computer out of warranty, whereas mine deals with a 1541 disk drive that is in warranty.

Mr. Wright's experience is much simpler than mine has been and continues to be. I am now in the process of trying to file a claim with the U.S. Postal Service for the non-delivery of the package. This will at least determine whether or not the package was delivered. I've also filed a consumer complaint with the Florida Department of Consumer Services—they're trying to get a response but have thus far failed in their efforts.

I won't go on, for it's far too long a story, but I did want you to know that there are others out here who *know* how Mr. Wright felt. I think better of you for publishing such an article, and I only wish someone at Commodore would wake up.

L.P. Thomason
Jacksonville, FL

A Note to Readers

I would like to hear from readers who have found applications for their C-64s in recording. I have enjoyed using my Commodore for business records and MIDI applications with sequences and drum machines, but would be interested in hearing about other musical uses.

Walt Aldridge
630 Windover Road
Florence, AL 35630

We've included your name and address, so if anyone has any helpful information, they can write to you. Readers?

Editors

The Best Peripheral

I just want to tell you that you have a great magazine. I just purchased my first home computer, a Commodore 64, and was looking for reading material to help me learn how to use it.

I picked up the March, April and May issues of *RUN* (the store didn't have any earlier ones) and took them home to read. I wasn't halfway through the first issue before I was filling out and mailing in my subscription request to you.

Since then, I have been thoroughly pleased with all the articles and information. The Magic column is fantastic and a real help to a novice like myself. I'm trying to get all your past issues and

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am anxiously awaiting next month's copy as well.

Thanks and keep up the fantastic efforts.

Robert G. Krajczynski
Colorado Springs, CO

Thanks for Writing

I am a one-year novice computerist, with the bug. I am a reader, not a writer, but I had to write to thank you and the *RUN* readers, who are writers, and are willing to share their knowledge with others.

My thanks go especially to people like George Warnusz (Magic, *RUN*, May 1984) for the substitute ribbon for the 1525 printer, and to Victor H. Pitre (Magic, *RUN*, February 1984) on connectors. Bits of information like these are valuable time-savers and I appreciate knowing the name and/or number of the item I am searching for.

J.M. Bayer
Yonkers, NY

Straight Talk

I would like to commend you on your excellent magazine. I am a charter subscriber and think each issue gets better.

Jim Strasma's Commodore Clinic doesn't pull any punches about hardware or software.

The comparisons on word processors (*RUN*, January 1984) and database programs (*RUN*, May 1984) were excellent. Having the reviewer specify what he or she liked and didn't like about a product is perfect.

I have just completed the excellent three-part series, "Relatively Speaking," by David Brooks. Please print more of these utility and educational programs.

Don W. de Lambert
Brookfield Center, CT

In a remarkably short time, *RUN* has become the best journal for Commodore computer users. I eagerly await each issue.

I appreciate the coverage you devote to reader comments and questions (Magic, Mail RUN and Commodore Clinic), as there is nearly always an interesting hint or tip in one of these columns.

The comprehensive reviews that cover a category of software are outstanding, too (e.g., the music program reviews in your April 1984 issue). I find also the technical articles (utilities, programming, applications) very good.

In general, your editorial focus is right on. I suspect I represent a fairly large body of readers who, in the last couple of years, have moved out of the ranks of complete novices and are looking for a fairly meaty publication.

Although you have to appeal to a wide audience, I hope you will minimize the space given to simple games, children's programs and the like. I would much rather spend my time and money exploring the intricacies of random files and the 1541 drive.

James L. O'Hare
Victoria, B.C.
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Commodore Clinic

By Jim Strasma

Commodore Clinic is a regular monthly column designed to help you, the RUN *reader, through any troubles or questions you have as you use your VIC-20 or C-64 computer. Send questions along with a self-addressed stamped business-size envelope to:*

Jim Strasma
Commodore Clinic
1238 Richland Ave.
Lincoln, IL 62656

So this column can help as many people as possible, please try to limit your questions to topics of general interest, and limit each letter to one question. This column is somewhat like a free medical clinic—the price is right, but the lines are long. Including a stamped self-addressed reply envelope (business-size) will cut your wait, but I can only give full answers to questions that will appear in the Clinic.

Software

Q: I have a C-64, a 1541 disk drive and an 801 printer. I am very interested in doing spiral designs. I received the Printer Utility Program, by Cardco. Is there any way I can dump to my existing printer without further expense?

D.S. Cescolini
Tracy, CA

A: Dumping a copy of the screen to the printer is one of the primary functions of Cardco's Printer Utility Program, so you certainly should be able to accomplish this with your equipment. My *Midnite* reviewers had no trouble using it.

Cardco lists a hotline number in their program manual, and can help you, although other readers report the number is often busy. Keep trying.

Q: I have enjoyed reading your column in *RUN*. I would like to know how someone who doesn't belong to a local user's group can get public domain software. Is there a person, company or group that does this by mail?

Information about *Midnite* would also be welcome.

Stella Nemeth
Rochester, NY

A: Thank you. Two Rochester user's groups are listed in May's *Commodore* magazine. You also have several other options. You asked for a group, a company and a person, so I'll give you one of each.

You can join and buy disks from TPUG, a reputable international user's group based in Toronto, Ontario. Public Domain, Inc. (W. Milton, OH), is a reputable U.S. company that sells disks and tapes at low prices, without a membership fee. Usually, you can also get the public domain programs I mention in the column directly from me, although I ask more than most groups ($15 per program, postpaid, on disk only).

Midnite was one of the first Commodore resources, and specializes in reviews. I edit it with my wife Ellen. For a sample copy, write: *The Midnite Software Gazette*, 635 Maple, Mt. Zion, IL 62549.

Hardware

Q: I keep reading about hardware which will allow my 64 to interface with Commodore's business disk drives. Will any of these configurations allow me to run business software, such as an accounts receivable package or the Home Accountant program, at a faster speed than I can with my 1541?

Alan Quint
Kalispell, MT

A: Yes, they should. The interfaces are known as IEEE-488 interfaces, and most allow you to use a 2031, 4040, 8050 or 8250 disk drive, at about four times the speed of a 1541. Or go for the now-discontinued 9060 or 9090 hard disk, and live it up at about 20 times the usual speed (and cost).

Some may use the same memory as your intended programs, and fail to work with them as a result. Others may fail because a program relies on some peculiarity of the 1541 itself. However, the Home Accountant will probably work, and can benefit from added disk speed. To be sure, buy the drive and interface from a dealer willing to take them back if they turn out to be incompatible with your chosen programs.

Currently, I am using the Bus Card, from Batteries Included, and the C-64-Link, from Richvale Telecommunications, both of Toronto, Ontario. Both are usable with most programs, but the C-64-Link is 30% cheaper, while the Bus Card is much easier to use.

Q: I own an 801 printer, and the letters that go under the line (like p or g) are written above the line. Do you have any suggestions?

Jeff Rosenblad
Princeton, NJ

A: The feature you want is called *descenders*, that is, the lower portions of extended characters descend below the typing line. The 1525 and 801 printers don't have it; most others, including Commodore's 1526, do. If you have a lot of time, you could simulate descenders by using high resolution graphics, as one public domain word processor for the PET did years ago.

Apart from that, if descenders are crucial to you, you may have to trade for a model with that feature.

Q: I own a recent 64, 1541 drive, C. Itoh 8510 printer and Cardco +G interface. When using my Magic Desk I cartridge, the printer will not do a linefeed at the end of a line. The same occurs when I run the printer test program

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on the 1541 demo disk.

I tried different secondary addresses. I also tried the dip switches in the printer and in the interface. Will Magic Desk work with my setup?

Also, I plan to buy either Word Pro 3 Plus/64 with Spell Right Plus or Easy Script. (Many thanks for *RUN*'s well-written feature article on word processors in the January 1984 issue.) Will there be any problems using my Cardco interface and C. Itoh printer with either?

Juan Carter
Palm Bay, FL

A: Using the same equipment, Magic Desk prints properly for me, so I presume switch settings are causing your problem. Here are the ones I use: On the +G, switches 3 and 5 off, the rest open; on switch SW1 of the Prowriter 8510, switches 2, 6 and 8 closed, the rest open; on switch SW2 of the Prowriter, switches 1, 2 and 7 closed, the rest open.

As for the word processors you mentioned, neither of them includes the Prowriter as an explicit option. If, however, you set the +G to emulate a 1525 printer, you can use the word processors as though you had a 1525, but without taking advantage of any of the 8510's added abilities, such as underlining.

If you need all of the Prowriter's options, consider a word processor that includes a Prowriter setting or a printer setup option. Two that allow this are Paperclip (from Batteries Included, Toronto, Ontario) and WP64 (from Pro-Line Software, Mississauga, Ontario).

Q: Is the 1540 disk drive compatible with 1541 software or the 64? If not, can it be made compatible?

David Covarrubias
Thousand Oaks, CA

A: The 1540 is completely read-compatible with 1541 software, as far as I know. However, it may not be fully write-compatible with current 1541s, and it's barely compatible with the 64. To use them together, you must turn off the 64's screen before you load or save a program, as though you were using a cassette.

Enter POKE 53265,11 each time, and the screen will go blank while your program is being loaded or saved. Entering POKE 53265,27 turns the screen on again afterwards. To avoid typing that on a blank screen, pressing the stop and restore keys has the same effect. To avoid this pain, upgrade to a 1541 by changing a ROM, as detailed last month.

Q: How can I interface an Atari 1027 letter quality printer to my 64?

John LeTexier
Roseau, MN

A: By buying the same printer in a Commodore-compatible version. Ed Lippert of Cardco tells me they are selling the same printer as the LQ-2, though I have only seen it briefly at a show. Don't buy the 1027 version—the Atari version is just for their own computers.

Q: Can I use a PET 2001 with a 4040 dual disk drive to make backup copies of disks produced from the 1541 disk drive? Are there any problems?

Bernard Kuebel
Peru, IL

A: Yes, you can make backup copies of 1541 disks on the 4040. I do it daily. However, the 4040 is not completely write-compatible with the 1541.

This means that you should avoid using a 1541 to alter the contents of a disk created by a 4040 and vice versa. Otherwise, after a few changes, you may be unable to read part or all of the disk. To avoid confusion, simply write the model number of the disk drive that formatted each disk on the disk label.

Q: I cannot find how to change the baud rate for a cassette. I am aware of the bandwidth limitation of a cassette, but I believe that Commodore's cassette can handle data at a higher baud rate than what it currently is. If you know how, please let me know.

Adel Sakla
Mobile, AL

A: You are correct, but before we get into that, let's remember that Commodore cassettes run faster than they appear to. Although the net data rate is only a bit over 50 characters per second, each character is saved twice, allowing a sophisticated error recovery system to automatically repair up to about 30 load errors.

This, combined with Commodore's digital recording technique, makes Datassettes more reliable than cassettes used by most competitors. (There are good reasons, for example, why you never hear of an Apple II with a cassette.) Increasing the baud rate of your Datassette will tend to chip away at the reliability.

Having said all that, a reasonably-priced commercial product does what you ask. The Rabbit cartridge, from Eastern House Software (Winston-Salem, NC), increases the Datassette's baud rate to 3600, nearly as fast as an early 1541 disk. The only disadvantage is that the cartridge must always be in place when loading or saving programs or data created with it.

Q: Why would my 64 run Wordpro, Multiplan and Superterm, but not a game like Beach Head? The game will not progress past the beginning game screen. Game sounds and color are OK, but there is no movement at all.

A dealer told me I have a bad RAM or video chip, but advised against replacing it, since the chips are all soldered in, and the chances of finding the right chip without damaging my 64 were very slim.

Kuri Kawakami
Anchorage, AK

A: First off, consider getting an opinion from a second dealer. Finding the correct memory chip to replace a bad one isn't always difficult. Each of the eight RAM chips in the 64 is responsible for one of the eight bits in each byte. The pattern of errors when using any memory test program usually indicates which one.

The video chip is *not* socketed on 64s I've seen, and can be checked by simply swapping it with one from a 64 that you know is good. If all the other programs always work properly, the chips you mentioned are unlikely to be your problem.

Of the programs you mentioned, only Beach Head requires a joystick. Try a joystick and see if the "fleet" of white dots at the top right of your screen responds to it. If so, Beach Head should work fine as soon as you move the fleet to the beach at the bottom of the screen.

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If not, consider swapping the 6526 CIA chip at U1, which controls the joystick ports. But before you do, try other games. If both joystick ports work on other games, the 6526 is probably healthy.

Another likely cause is a mismatch between your disk drive (or your IEEE interface if you're using one) and the DOS protection used in Beach Head. Try it on a different disk drive, preferably a Commodore 1541.

Also try a different copy of Beach Head. There is a small chance your drive is misaligned or that your copy of the program is defective.

The basic principle here applies to all such problems. Isolate troublemakers by substituting parts that you know are good. The substitution that makes the difference indicates the cause.

Q: I put a reset switch in my VIC, and since then my joystick will not move left. Is this because of the reset button?

William Heger
Chicago, IL

A: Could be, especially if the joystick failure happened immediately after adding the reset switch. If your reset switch is removable, take it off and see if that fixes the problem. If not, try swapping the 6522s at UDE8 and UDE7. Both are involved in controlling the joystick, and both are also connected to the reset line. If swapping them makes a difference, one or both are probably bad and will need to be replaced.

Always be careful to turn off the power and avoid shorting anything out when plugging things into your VIC or modifying it in other ways.

Q: I am using a Panasonic CT-1300D color monitor with my 64, connected to the composite input on the monitor. Is there some practical method by which I can use the RBG connector and take advantage of improved resolution?

George Benton
Metairie, LA

A: Sorry, no one has offered an RBG interface for the 64 yet, as far as I know.

Q: I am using Data 20's 80-column board on my 64, and have some questions about it. Can I use SuperCalc with it? It runs under CP/M and needs that module plugged into the expansion port along with the Data 20 board.

Could I use an expansion interface board such as the one from Compuscope to use both modules at the same time? Would the two cartridges be compatible?

Paul Gunzenhauser
Garden Grove, IA

A: No, yes-but and no. Commodore's CP/M cartridge is not compatible with 80-column cards, even though you can physically plug both into an expansion motherboard at once. A possible alternative would be Data 20's Z80 version of their 80-column card, which reportedly uses the SB-80 CP/M sold by Lifeboat Associates in New York City. However, I have yet to hear that Lifeboat is actually providing CP/M programs in Commodore 1541 format. If and when they do, Supercalc should be available.

Another *RUN* reader reports that programs are available for downloading on Commodore 64s from the Commodore Information Network on CompuServe that patches Commodore's version of CP/M to work with 80 columns and twin single disk drives (device 8 and 9). I've not tested them, but the price is right (free).

Programming

Q: I recently purchased a 1541 disk. After a month, I got an error message—"file not found." This occurred with every disk I tried, and I know all the disks were good. Commodore sent me a replacement drive, but after a week the same thing happened, so I also sent that drive back for repair or replacement.

What I would like to know is—am I doing something wrong, or is this a common problem with the 1541?

James Kerins
Seaford, NY

A: I can't say anything definite, as you haven't quite given me enough information. The error message you received is an operating system message from the 64, not the 1541 (although there is an equivalent disk error message). It means what it says—the computer tried to find and load the file you requested, but either didn't find it at all or did not succeed in loading it.

After you see this message from the computer, the error light on the front of the 1541 should be flashing. To find out what the real problem was, you need to read the error channel of the disk. Here is a brief program which does that.

```
10 OPEN 15,8,15:REM OMIT IF ALREADY
   OPEN
20 INPUT#15, A,B$,C,D
30 ? B$
40 CLOSE 15:REM OMIT IF ANY FILE
   STILL NEEDS TO BE OPEN
```

It must be entered into memory, not used in Immediate mode. The variable names can differ, but the second one must be a string, as shown in line 20. When the program is run, the true reason for the disk failure will appear on your screen. It could be anything—from not having a disk in the drive, to misspelling the name of the program desired, to one of dozens of actual faults in the disk or drive.

Before you send another drive back, get some help from a dealer or friend who knows how to use the 1541, and test your drive and disks by substituting them with a drive and disks already known to work. If, for instance, those disks you know worked before now fail on a drive that works for its owner, then something has hurt your disks, and getting a new drive probably won't help.

Q: The program Disk Master ("Disk Master Revisited," *RUN*, February 1984) was just what I needed. But since I had many disks before the Disk Master program came out, I need to change their disk name and ID numbers for the program to work. Can you suggest a way this can be done?

Jean Weitzel
Painesville, OH

A: Yes, but you won't like it. Copy each disk entirely onto a fresh disk with the name and ID number Disk Master needs. You can do this with a dual disk drive, or two single disks and a program like Copy All on Commodore's bonus disk or by using a single disk, with a program like Backup 1541, also on the bonus disk.

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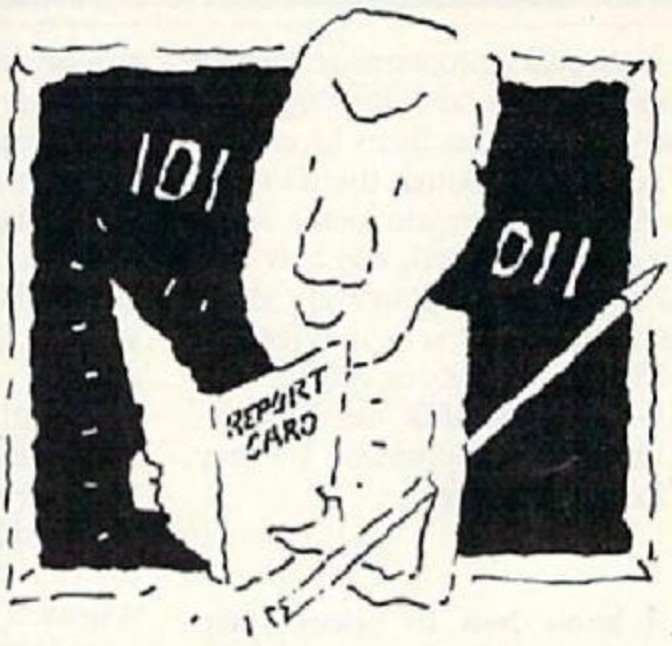

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Although utility programs to change disk names and IDs exist, I strongly recommend you not use them to change the ID number. Although the ID number that appears when you load a directory can easily be altered, it is only cosmetic. The real ID is kept in every sector of the disk, in a way you cannot feasibly change. Since the ID is one way the disk drive knows a new disk has been inserted, changing the cosmetic ID may lead to loss of data later.

Q: I know how to delete a file from my disks, but I can't—the filename is still on my list of programs. Do you have a way to erase my programs from my list?

Jeff Rosenblad
Princeton, NJ

A: Here's the method I use:

```
OPEN 15,8,15,"S0:NAME"
```

(NAME is *exactly* what appears between the quotes when it appears in a directory listing.) If file 15 is already open to the disk command channel, use the following line instead.

```
pR15,"S0:NAME"
```

(A p followed by SHIFT R is the recommended abbreviation for Print#.)

If the error light on the disk begins flashing, use the disk error status routine listed earlier to find out what is wrong. Odds are, you'll either have forgotten to remove the write-protect tab on the side of the disk or you misspelled the program's name.

Q: I wrote a sequential file program for either the VIC or 64, using the 1541 disk. I use Input statements to enter data for fields, but if I enter more than 76 characters in a string field, I receive a Syntax error. Is it possible to enter larger fields? I would like fields of at least 1000 characters, and more if possible.

William Kerr
Lynbrook, NY

A: At the moment, your problem isn't in your file, but rather in your data entry method. And it's a serious problem. You are asking to violate two of the fundamental limits of Commodore (and most other) computers.

First, there is a strict limit to the length of an Input statement, set by the size of the input buffer reserved by the operating system. On the 64, it's set at two screen lines, including the leading question mark and space and the trailing carriage return. On the VIC's narrower screen, up to four lines are allowed. The buffer holds 88 characters, so your guess of 76 characters is close enough.

The other fundamental limit is the 255 character limit on the length of a single string. If it weren't for this limit, you could solve your problem by using the Get statement in place of the Input statement. As it is, you'll have to divide your data somehow so it can be grouped in bunches no larger than 255 characters. Note: You can stack as many of these as you wish end to end in a sequential file, and consider them all part of the same logical record.

One other consideration—if you do use Get to lengthen your fields, also use Get# to retrieve them from disk. Input#'s capacity is the same as Input's.

Q: I have a VIC. In going through its accompanying manual, I have typed and retyped the programs in chapter 5 without any success. When typing in the programs, I find that the computer never picked up the last line in the program. If I type in the last line again, it works.

Also, I notice that in writing a program, I have to type it twice to get the computer to pick it up and run. Why?

Charles Bailey
Jacksonville, IL

A: Although an errant Poke could wipe out a program line, and there have indeed been some errors in that manual, I don't think that's your trouble. From your description, I think you are suffering from a common mistake made by new users.

When you are typing in program lines, nothing is entered into the computer's program memory until you press the return key, even if the cursor has moved onto another screen line some other way. If this doesn't solve the problem, there are two user groups in Springfield and another in Quincy that can help you.

Q: I have been unable to determine how—or if it is even possible—to print out the run of a program on my 1541 Commodore printer. Can I do this with my 64?

Evelyn Arnold
Fort Lauderdale, FL

A: Hmmm, the 1541 is a disk. Well, no matter. We can do it both ways. This is one of those rare times when the CMD command is essential. To dump a program run to paper, start the program this way:

```
OPEN 4,4
CMD 4:GOTO 100
```

(where line 100 is the first line in the program). Then, when you are done, type:

```
PRINT#4
CLOSE 4
```

(but don't abbreviate Print# as ?#). While your program is running, whatever would normally go to the screen will now go instead to the device specified in the Open statement for file 4—in this case, the printer.

To send your running program to the disk instead, simply change the Open statement in the above sequence to:

```
OPEN 4,8,2,"0:DUMP,S,W"
```

(DUMP is replaced with the filename you choose.)

Q: When I save and load programs on the Datassette with the 64, it works great. But when I put a commercial game in the Datassette and load it, all I get is "searching, found, title and then syntax, no memory and error. Is there a command to put it into the 64?

Frank Cermak
Westchester, IL

A: Most likely the commercial program you are trying to load has been doctored, either to save memory, or to keep you from copying it for others. If so, it probably wants to load in at an address other than the usual ones used by your 64, most likely in the stack, which starts at address $0100. Loading there allows the program to run the moment it is loaded, whether you want it to or not.

To see if this is the case, try loading the program with the following command.

```
LOAD "",1,1
```

There shouldn't be any spaces between the two sets of quote marks. This tells Basic to load the program back into the

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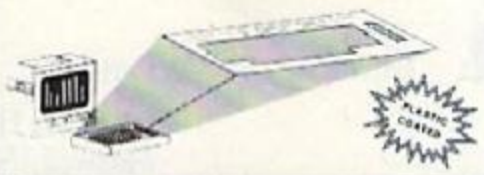

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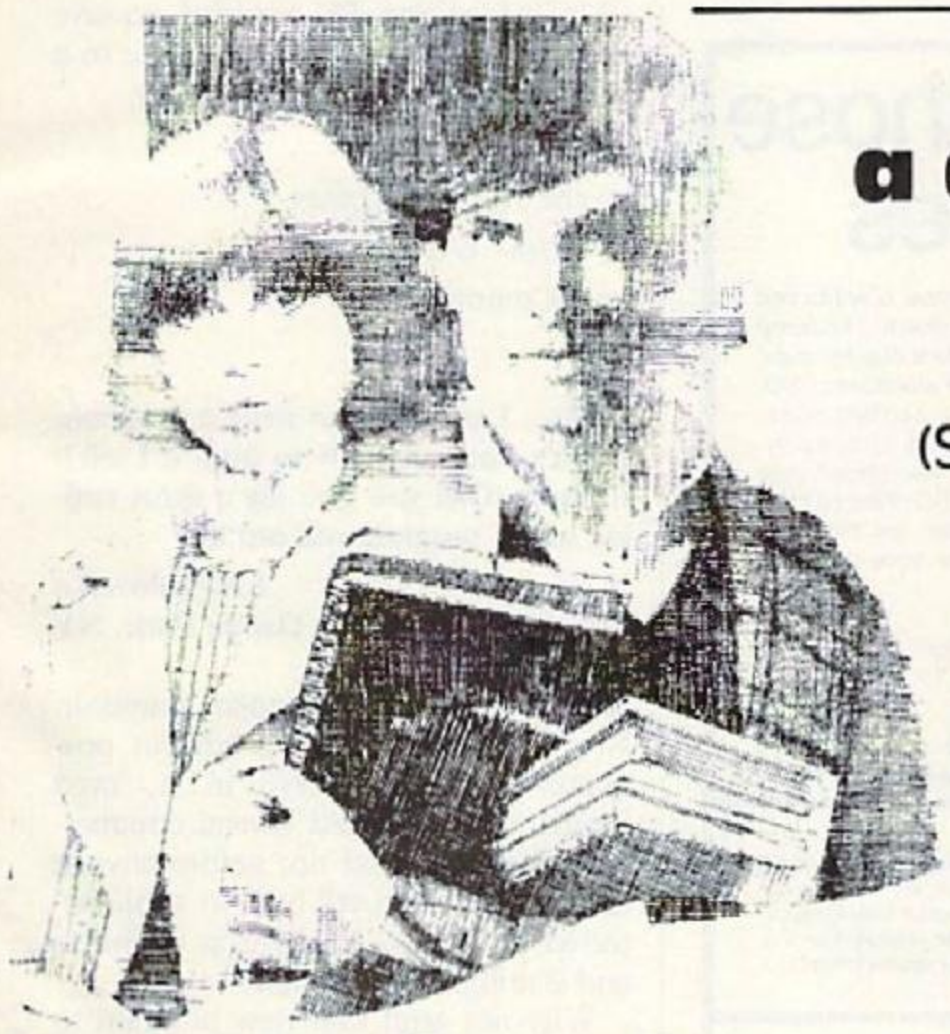

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same addresses from which it was saved. If this cures the problem, use it whenever you run that program.

Q: Can I use a PET system to load and list programs from the 64? Also, is there a program that will allow 64 programs to be run on the PET?

Bernard Kuebel
Peru, IL

A: Yes and no. To load a 64 program into a PET, simply type

```
POKE 2048,0:POKE 41,8
```

before trying to list the first 64 program you load into the PET each day. Then, when you are done with 64 programs and want to load PET programs again, either turn the computer off and on again, or type: POKE 41,4.

As for your other question, I've not heard of a 64 emulator for the PET. On the other hand, any 64 program that avoids the keywords Peek, Poke, Wait, SYS and USR( ) should run unchanged on a PET.

Q: How can I save a variable?

Tim Holl
Roswell, NM

A: By putting it in a data file. Saving the contents of variables is the main reason for having data files. Otherwise, all the information developed during the run of a program would be lost when you turn off the computer. Assuming your variable is named A$, save it on cassette this way:

```
900 OPEN 1,1,1,"NAME"
910 PRINT#1,A$
920 CLOSE 1
```

If you have a disk, change line 900 to:

```
900 OPEN 1,8,2,"0:NAME,S,W"
```

Then, to load back your variable the next day, use these lines:

```
950 OPEN 1,1,0,"NAME"
960 INPUT#1,A$
970 CLOSE 1
```

And for disk:

```
950 OPEN 1,8,2,"0:NAME,S,R"
```

If you have more than one variable to save, add more lines like 910 and 960, one line per variable. (It's OK to combine several variables in line 960, separated by commas, but don't combine variables like that on line 910.) All this is explained in much more detail in chapter 6 of my book *The PET Personal Computer Guide* from Osborne/McGraw-Hill.

Q: I'm converting some Apple programs to the 64. My only hangup is the command MOD. I know what the purpose of the command is, but I can't find a command on the 64 that will replace it. If you could help, I will be most grateful.

Jimi Kilby
Fort Mill, SC

A: For the benefit of others who *don't* know what MOD does, it finds the remainder portion of the result when one number is divided by another. To simulate it on a Commodore computer, use this expression:

```
INT(T – B*INT(T/B))
```

(B is divided into T). As usual, to save the result, you must either assign it to a variable or print it out. Thus,

```
C=A MOD B
```

on the Apple, becomes

```
C=INT(A – B*INT(A/B))
```

on a Commodore.

Q: I am trying to write a program. I don't want anybody to list it if I sell it to them. Can you give me a short ending so my program will not list?

Erik Saloveiko
Ozone Park, NY

A: A far too popular question. No, I won't tell how to protect programs—I don't believe in it, even though I've authored several commercial programs. And no, before anyone asks, I also won't tell how to steal protected programs. I believe in openness and sharing, but not theft.

Why not send that new program to *RUN* so all can benefit from what you've learned? You'll earn something for it, get a bit of fame and benefit the world. Some folks may steal your program, but they would have anyway, and they'll regret it. 'Nuff said. R

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Book Gallery

Compiled by Shawn Laflamme

Discover Your VIC-20: A Beginner's Guide to Real Programming

Donald Kahn Jr. and Nevin Scrimshaw
Birkhauser Boston, Inc.
380 Green St.
Cambridge, MA 02139
Softcover, 94 pp., $10.95

This may not be the best book for owners of a VIC-20 who want to learn programming, but it is still a good choice.

Authors Kahn and Scrimshaw use a good approach for teaching beginners to use the features of their VIC-20s to full advantage. The book is divided into 16 chapters, none of which is more than six pages long (many are shorter). Each chapter uses simple programs of six to ten lines to introduce Basic keywords, their functions and how to use them.

Chapters one through four should be considered a unit of introduction to the VIC's keyboard, Basic modes, the concept of Basic variables, and use of the Commodore full screen editor. The remaining chapters can be studied consecutively or randomly, as each is self-contained, embracing some fundamental concept. However, the authors have organized these chapters to build upon one another and to minimize the monotony of textbook learning.

Topics covered are music, use of color, number theory, string manipulation, game making and user-defined characters. Many chapters repeat topics, each more complex in application and building upon skills learned in previous units. (There are four chapters describing the use of color.)

The slant of the book appears to be toward graphics and gaming. Don't let this fool you. Groundwork covered in each chapter provides skills that can be combined to achieve just about any goal you may set for a program.

All of the programs given can fit easily into an unexpanded VIC-20. There are several useful charts and tables provided at the back of the book.

The building-block concept used by the authors, combined with the attractive illustrations and below average price, make this a useful book for newcomers to VIC-20 programming.

Thomas Franks
Wadsworth, OH

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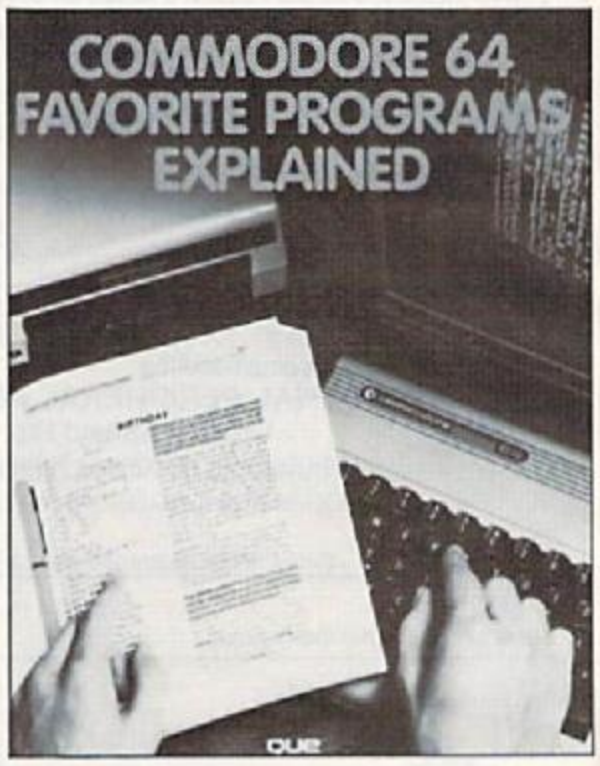

If you decide to buy this book, be prepared for a lot of typing. Most of the programs are over 300 lines long.

But, think twice before you buy it, or take a close look at it in the store; I'm not sure whose favorites the programs are, and they are not entirely well-explained in the text.

It is perhaps unfortunate that the first program makes a bad impression; I am willing to admit that it might be coloring my opinion of the book as a whole. The program is an adding machine emulator, and even though it works well enough, the program design could be better. Quite a few program lines are devoted to letting you stipulate what kind of printer you intend to use, and then setting the configuration for that particular printer. It would be much easier for the reader if specific configurations were explained in the text, and only the one necessary typed into the listing. The explanation of the program is confusing, due to the fact that the line numbers mentioned in the text do not match the line numbers in the listing.

Only surface explanations are given for many of the programs, which will leave you wondering how the program actually works if you are not already well-grounded in Commodore programming.

Another complaint I have with this book is the length of the listings. There are many instances where compound commands or use of logical operators would cut the length of the listing, and therefore the typing time, considerably. As they stand, the listings look neat on the page, with plenty of blank space around them to spare your eyes. However, their length is daunting.

I can't say that I tried a lot of the programs, having been put off by line numbers reaching into the 5000s. However, the ones I did try certainly worked, and the rest, on close reading, don't seem to have any problems.

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math skill builders, hangman and other games to home utilities such as a checkbook balancer and a name/phone file.

If you don't mind spending a lot of time entering programs, and you can be satisfied by less than thorough explanations of how the programs work, you might try *Favorite Programs*. Just don't expect it to be a breeze.

Sharon Aker
Sussex, NJ

Kids and the Commodore 64

Edward H. Carlson
Datamost, Inc.
20660 Nordhoff St.
Chatsworth, CA 91311
Softcover, 235 pp., $19.95

This book is obviously for kids, but other beginners may benefit from it as well. In fact, an adult may well find it a breath of fresh air after working with the stuffy user's manual. It explains the basic and not-so-basic aspects of Commodore 64 programming in a thorough, understandable manner.

Kids and the Commodore 64 is arranged much like a school textbook, with questions and assignments in each chapter, and answers at the back of the book. In fact, it was designed to serve in the classroom as well as the home; it includes teachers' notes that give an overview of each new section and suggest extra assignments.

While procedures for using the Datassette recorder are covered nicely, similar coverage of disk drive commands is conspicuously absent. Considering reports that some 90% of C-64 purchasers also eventually add the disk drive to their systems, that's a rather large oversight.

Little else has been left out, however. Wonderfully clear descriptions of programming concepts such as For/Next loops and arrays are presented in easily understood steps. The peculiarities of Commodore screen formatting (with all those graphics symbols for direction!) are explained well, with later programs using easily remembered abbreviations for the cursor controls.

Kids and the Commodore 64 is spiral-bound, which makes it easy to work with at the computer table. The layout of the text is easy on the eyes, with plenty of blank space and amusing illustrations.

Now that I've praised the book, let me add a caveat: While the first one-third or so of the book is ideal for even a ten-year-old, the later chapters will be rough going for someone that age. This is no fault of the author—let's face it, the Commodore 64 is not a programmer's dream, and the method of designing and using sprites or accessing the sound chip just cannot be simplified enough for most youngsters to grasp.

So, consider this a family book—let the kids learn from the early chapters, and the parents from the later ones. The teenage would-be hackers, of course, can use the whole thing.

Sharon Aker
Sussex, NJ

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RUN Amok

Item: We have received requests for the telephone numbers of some of the bulletin board systems mentioned in "The Joy of Modems," by Annette Hinshaw (*RUN*, June 1984). The number for the Tulsa Information Exchange is 918-438-3363, and for the Tulsa Bread Board System it is 918-749-0059.

Item: In "Play Ball," the program in the July issue that dealt with handling baseball statistics, the author, Paul Howe, mentioned that you would have to make changes in the program if your printer did not support decimal tabbing. For those who have a VIC-1525 (or similar) printer, we list here the end of the program, incorporating the necessary changes in the printer routine.

```
82ØØ REM ************ STATS TO PRINTER ************
821Ø IFAD=ØTHENAD=1:GOSUB217Ø
8215 PRINTCHR$(147):INPUT"STATS THROUGH GAME #";GN
822Ø PRINT:PRINT"{3 SPACEs}TURN PRINTER ON, SET PITCH,
     MARGINS"
8225 PRINT:PRINT"AND LINE SPACING.":PRINT:PRINT
823Ø GOSUB95ØØ
824Ø OPEN4,4:CMD4
8245 PRINT"SOFTBALL STATS THROUGH GAME #";GN
825Ø PRINT
826Ø PRINT"NAME"SPC(8)"AB"SPC(6)"H"SPC(7)"R"SPC(7)"RBI"
     SPC(5)"BB"SPC(7)"AVG"
827Ø PRINT
828Ø FORI=1TONP
8285 ZZ=11-LEN(N$(I))
829Ø PRINTN$(I);SPC(ZZ);
83ØØ FORJ=1TO5
83Ø5 ZZ=7-(LEN(STR$(B(I,J))))
831Ø PRINTB(I,J);SPC(ZZ);
832Ø NEXTJ
833Ø PRINT B$(I)
834Ø NEXTI
835Ø PRINT:PRINT"TOTALS{5 SPACEs}";
836Ø FORJ=1TO5
8365 ZZ=7-(LEN(STR$(M(J))))
837Ø PRINTM(J);SPC(ZZ);
838Ø NEXT
839Ø PRINTM$
84ØØ PRINT#4:CLOSE4
841Ø RETURN
```

Listing of the printer routine portion of the Play Ball program.

Item: In the **Updates** section at the beginning of July's Commodore Clinic (p. 8), the telephone number given for Robert Shannon was incorrect. Shannon's correct number is 707-964-4440.

Item: In the review of the Ramax memory expander, from Apropos Technology (August 1984, p. 124), the retail price of the product was incorrectly listed as $79.95. The correct price is $89.95.

Clubs

Brandon, FL

The Brandon User's Group promotes and educates the general public in the use of the VIC-20 and C-64. The group holds meetings on the second and fourth Fridays of the month, from 7–10 PM, at the Brandon Civic Center, Sadie St., Brandon, FL. Meetings offer guest speakers, as well as members teaching Basic, intermediate and advanced programming, machine language, computer math and science and telecommunications.

The group offers its members a monthly newsletter and a club library with magazines and public domain tapes and diskettes. Regular membership dues are $10/yr, family membership $15/yr. There is a satellite group which meets in Wimauma, FL (covering southeast Hillsborough County) on the second and fourth Tuesdays of the month.

For more information, write to Phil Coldwell, 813 Valley Hill Drive, Brandon, FL 33511.

Scranton, PA

The Scranton Commodore User's Group meets on the second Tuesday of the month, during the school year, at the South Abington Elementary School, in Clark's Summit, PA. Meetings begin at 7:30 PM, with doors opening at 6:30 to give members the opportunity to copy programs from the group's libraries, or to print listings. The group publishes a newsletter and offers group discount prices on blank tapes and disks.

For more information, write to The Scranton Commodore User's Group, PO Box 211, Clark's Summit, PA 18411.

Folklife Terminal Club

The Folklife Terminal Club, an international Commodore computer user's group, has announced that it is making its software library available to other users of Commodore equipment.

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The club's library contains more than 5000 public domain programs in the areas of education, science, business, games and more than 25 other categories. The programs are stored on disks and are usable on various configurations of PET, CBM, 64 and VIC computers. The software itself is free.

The first disk that should be ordered is the "Catalog Disk," which contains an automatic disk cataloging program, a listing of all the available programs, complete instructions and Associate Membership in the club. There is a copying and mailing fee of $15 per disk. In ordering, be sure to specify which Commodore disk drive you have.

Contact Folklife Terminal Club, Box 2222-RN, Mt. Vernon, NY 10551.

New Philadelphia, OH

The Commodore 64 User's Group (CUG) is a newly organized user's group, and is growing rapidly. Anyone living in the New Philadelphia, OH area can contact CUG, Jeff Eklund (Club President), 702 Park Ave. N.W., New Philadelphia, OH 44663, 216-364-6158.

Staten Island, NY

The theme of the first meeting of SICOM (Staten Island Commodore User's Group) was "Computers Don't Byte," a topic geared toward the novice Commodore user. The group's organizer, Tony Isoldi, hopes to establish a collection of people who will exchange programs and ideas concerning Commodore computers.

For information concerning future meetings, write SICOM, 3770 Richmond Ave., Staten Island, NY 10312, or call Tony Isoldi at 212-984-4256.

Parsippany, NJ

The Morris Area Commodore User's Group (MACUG) meets on the third Tuesday of each month, at 7:30 PM, in the Parsippany Library, 292 Parsippany Road., Parsippany, NJ.

The group publishes a monthly newsletter, has available to its members a public domain library, and special interest groups that meet regularly.

For information, write Tom Limoncelli, Secretary, 61 Early St., Morristown, NJ 07960, 201-267-5088, or Stan Fenster, Newsletter Editor, 36 Bordeaux Drive, Parsippany, NJ 07054, 201-887-3659.

Broward County, FL

The Broward Commodore User's Group (BCUG) meets at 6:30 PM, on the first Wednesday of the month, at the Broward Community College central campus in Davie, FL.

The group offers members a monthly newsletter (filled with tips and information) and access to a large software library. The club also offers associate memberships and two on-line bulletin board systems, which all Commodore users are welcome to call. BCUG is interested in exchanging newsletters and software with other clubs.

For information, contact Lewis Horn (Club President), Broward Commodore User's Group, PO Box 25794, Tamarac, FL 33320.

Queens, NY

If you live in the Queens, NY area, you may be interested in the Commodore 64 User's Group that recently formed there to assist members in learning more about the C-64.

The group meets at the Flushing Branch of the Queensborough Public Library, 1 Library Plaza (Main St. and Kissena Blvd.), Flushing, NY, on one Saturday per month at 10:00 AM. Admission is free.

For more information, contact Sam Soltan (Club President), 67-42 Harrow St., Forest Hills, NY 11375.

User's Group News

We welcome news of user's groups, and run as much as space allows. Please address letters to Susan Tanona, *RUN*, 80 Pine St., Peterborough, NH 03458.

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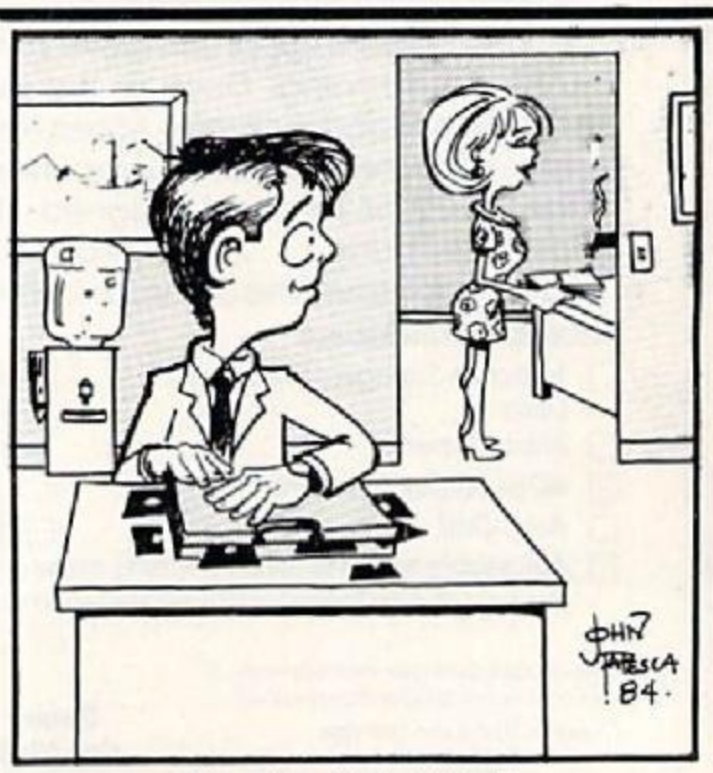

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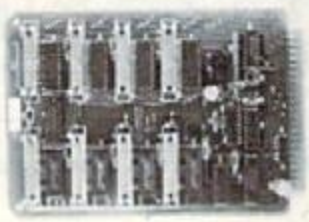

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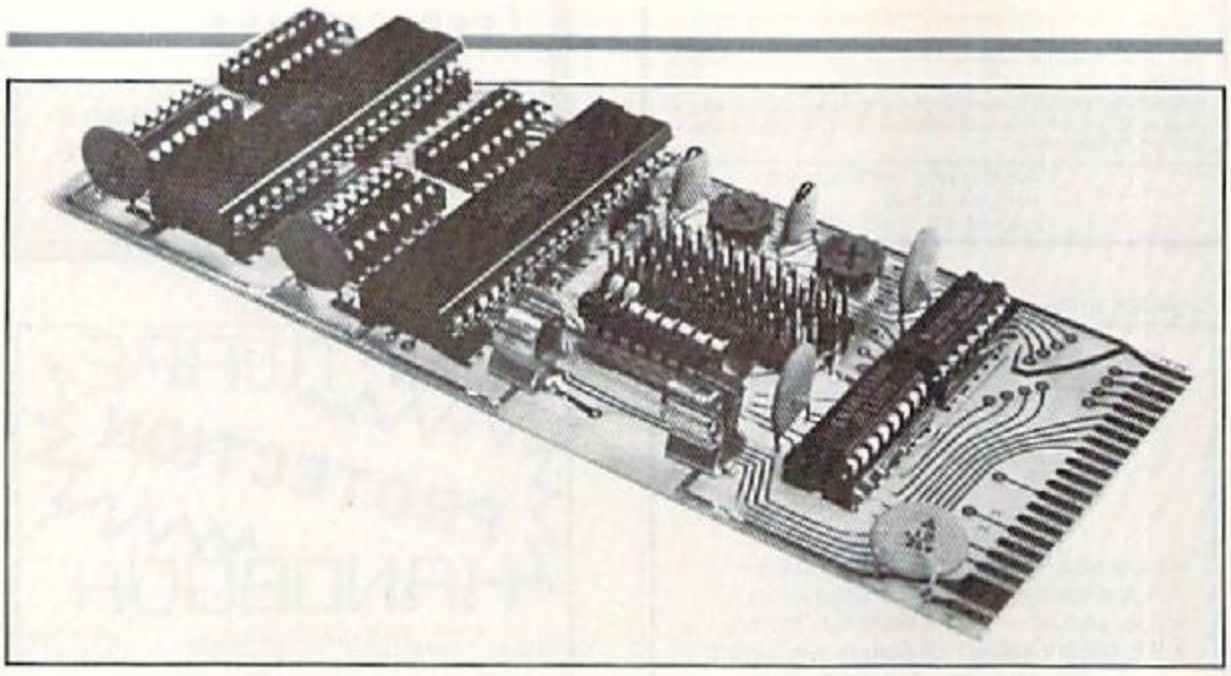

Interface Adapter Board

Schnedler Systems (1501 N. Ivanhoe, Dept. NR, Arlington, VA 22205) has introduced the Dual 6522 Versatile Interface Adapter (VIA) Board for the Commodore 64.

With the VIA Board, 6522 programming techniques can be applied to the C-64 for real-time control applications. The board allows full use of the IRQ interrupt. When combined with the C-64's memory capacity, it provides a development system and a controller in one package. Extensive application notes and programming examples are included.

The VIA Board (Model 64IF22) is available for $169; each additional board costs $149.

Check Reader Service number 424.

Amber Monitor

Sakata USA Corp. (651 Bonnie Lane, Elk Grove Village, IL 60007) has introduced the SA-1000 CRT Display Amber Monitor. The SA-1000 is compatible with the C-64 and the VIC-20.

The SA-1000 has a 12" screen and a dark faceplate. Other features include: composite video input signal, scanning frequency of 15.75 KHz (horizontal) and 60 KHz (vertical), a resolution of 900 dots center and 800 dots corner, RCA jack input connector and a 2000-character display format. It is available for $159.

Check Reader Service number 428.

May the Force Be with You!

Parker Brothers (50 Dunham Road, Beverly, MA 01915) has released Star Wars: The Arcade Game for the Commodore 64.

All three screens of the arcade version are included in this game. The action begins deep in space as you confront an onslaught launched by Imperial Tie Fighters. You must destroy them with your laser cannons.

After the fighters have been vanquished, you must then fly over the surface of the Death Star, through dangerous laser towers, which you must destroy en route to the vulnerable main reactor of the enemy space station. From there, you will move on to the famous trench of the Death Star, where you must avoid enemy gun turrets and aim a direct hit down the exhaust port of the main reactor. A direct hit will ignite the Death Star into an exploding supernova.

Star Wars: The Arcade Game is available on cartridge for $40.

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New Products RUNdown

Arcade Space Thriller

Datasoft, Inc. (19808 Nordhoff Place, Chatsworth, CA 91311) has released the Commodore 64 version of Konami's Juno First.

As pilot of the Juno First spaceship, your mission is to defend humankind and the solar system from hostile aliens. You must destroy the waves of fearless alien intruders with your powerful laser blasts. If the situation becomes desperate, you may have to utilize the Juno First warp controls, firing the ship through time and space to safety.

Juno First is available on disk for $29.95.

Check Reader Service number 423.

Low-Priced Utility Program

Educomp (2139 Newcastle Ave., Cardiff, CA 92007) has released Power Plus, a utility program for the Commodore 64.

Power Plus adds over 40 commands to the C-64. The program is designed to make it easier for you to write and debug programs, send disk commands and write machine code. Features include screen dump, automatic line numbers, renumber, find/change, change colors, machine language utilities and more.

Power Plus is available on disk for $19.95.

Check Reader Service number 419.

Grade-Reporting System

Grade Manager 2 Plus is a grade-reporting system for teachers using the C-64 or the VIC-20.

The program will sort student lists, keep track of assignments and grades and calculate averages. Reporting methods include Student List, Assignment Summary, Missing Assignments, Current Averages, Student Summary, Selective Analysis and Cumulative Averages.

Records can be maintained for up to 100 students and 65 assignments per file. The program is available on disk or cassette for $29.95. Smoky Mountain Software, 13 Catatoga Path, Brevard, NC 28712.

Check Reader Service number 425.

C-64 Learning Package

PractiCorp (The Silk Mill, 44 Oak St., Newton Upper Falls, MA 02164) has released 64 Pak, a package of learning programs for the C-64 that provide instruction in areas such as reading, geography, mathematics and more.

These menu-driven programs are designed to help the beginning computer user to learn and interact with a computer. The ten programs in the 64 Pak curriculum include: Flash Cards, Speed Read, Sign Talk, Life Expectancy, World Clock, States and Capitals, Mortgage Calculator, Big Time, Cash Register and Perpetual Calendar.

The package is available on disk for $24.95 and cassette for $19.95.

Check Reader Service number 417.

Keep Track of Your Widgets

Southern Solutions (PO Box P, McKinney, TX 75069) has added a new program to their BusinessWare series for the Commodore 64.

The WidgetTracker is an inventory management program that supports all transactions, including purchases, orders, sales and credit memos. The program allows you to generate the following reports: Sales Analysis, Price List, File List, Low Quantity and On Order. You can also set screen colors, and you can calculate the totals of selected items appearing on your screen.

The WidgetTracker is available on disk for $79.95.

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For the Investor

StockTrender, from J.B. Horton Co. (PO Box 2426, Bethlehem, PA 18017), is designed to provide the investor with tools to analyze the performance and trends of investments using weekly price data.

The program can store and maintain 53 weekly closing prices for each of over 100 stocks per disk. It is menu-driven, providing on-screen prompts for the decisions needed to carry out the necessary operations.

StockTrender is available on disk for the Commodore 64, with a retail price of $75. The package includes duplicate program disks (master and backup) and a manual.

Check Reader Service number 403.

Wizard

Progressive Peripherals & Software (2186 South Holly, Suite #2, Denver, CO 80222) has released Wizard, an action/fantasy game for the Commodore 64.

Using your joystick, you must climb, jump, duck and run through forty screens in a quest for treasure. You will face fires, plummeting boulders, sliding gates and over 20 other animated opponents.

A Construction Set program is also provided, allowing you to build your own screens.

Wizard is available on disk for $39.95.

Check Reader Service number 405.

Get the Connection

The VIC/64 Switch is an accessory that allows several VIC-20s or C-64s to access the same disk drive or printer.

Up to eight computers can be connected to the switch, giving all of them access to the same disk drive and printer. Either model, or any combination of VICs and C-64s, can be connected to the switch at the same time.

The VIC/64 Switch operates with the 1540 or 1541 disk drive and a serial printer. It is available on cartridge for $149. Handic Software, Inc., Fellowship Business Center, 520 Fellowship Road, B206, Mount Laurel, NJ 08054.

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... Sonar reports the "whine" of torpedoes running toward you. You kick the destroyer's rudder full-right and order flank speed.

As you watch, two torpedoes cross your bow. Sonar returns quicken and you close on the submarine below. Suddenly, bearing to target shifts 180 degrees and the sonar return is instantaneous. THE SUB IS DIRECTLY BELOW! You stab the fire button and watch as 6 depth charges arch into your wake. Several long seconds pass before they explode, sending six domes of white water to the surface. The message "SUBMARINE SUNK" flashes on the screen. But congratulations are brief. Four more subs are lurking out there somewhere, trying to escape into the open ocean...

SONAR SEARCH is a "fast-action" strategy game based on anti-submarine warfare. You are the commander of a group of three destroyers sent to intercept a pack of 5 enemy submarines. Equipped with sonar gear and depth charges, and aided by submarine sightings from other ships and aircraft, you must get directly over a sub to score a hit with your depth charges.

SONAR SEARCH makes full use of the high-resolution graphics, multicolor and audio capabilities of the Commodore 64. Programmed in machine language to provide immediate response to your commands, SONAR SEARCH is realistic, educational and entertaining. Comes complete with Instruction Manual and keyboard template.

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Quasar

In Quasar, you are the pilot of a sophisticated space fighter. Your mission is to destroy the Etron rocket base on the planet Hagon.

As you enter the fearsome space tunnel, the Hagon defense systems have alerted their fleets—wave after wave of Astro fighters come hurtling toward you. If your mission fails, the awesome Etron rockets will destroy your galaxy.

Quasar is available on disk and cassette for the Commodore 64. It retails for $19.95. Advantage Computer Accessories, 1020 Meyerside Drive, Unit 8, Mississauga, Ontario L5T 1K7 Canada.

Check Reader Service number 414.

An Incredible Journey

EduSoft (PO Box 2560, Berkeley, CA 94702) has released Simulated Computer, a simulation of the inner workings of a computer.

The program takes you on a journey through an imaginary computer, revealing the secrets of machine and assembly language programming.

You create a computer program using a simplified code. You can see and hear the flow of data as your program travels into memory, as registers are modified and as the CPU processes information.

Simulated Computer is available on disk and cassette for the Commodore 64. Retail price is $29.95.

Check Reader Service number 410.

How Fast Can You Type Right?

How Fast Can You Type Right? is a series of timed typing exercises designed to increase the typing speed and skill of those who have already mastered the basics of touch typing.

The program is menu-driven, with introductory spelling and vocabulary practice provided for each lesson. Errors are tabulated and scores are given. All instructions appear on the screen; no documentation is needed.

How Fast Can You Type Right? is available on disk for the Commodore 64. Retail price is $39.95. Barron Enterprises, 714 Willow Glen Road, Santa Barbara, CA 93105.

Check Reader Service number 415.

Parental Guidance Suggested

Childpace is a child-development aid designed to help parents and teachers of preschoolers evaluate the dexterity, language and social skills of children from three months to five years of age.

Childpace helps you to evaluate your child's progress as he begins to develop motor skills and recognize his surroundings. It can alert you to potential problems at an early age so that professional assistance can be obtained.

The program uses simple exercises that allow you to interact with your child, such as identifying parts of the body, responding to questions, rolling a ball, stacking blocks and identifying colors.

In the child care center, Childpace can evaluate and maintain records on as many as 16 children.

Childpace is available on disk for the Commodore 64. It retails for $39.95. Computerose, Inc., 2012 East Randol Mill Road, Suite 223, Arlington, TX 76011.

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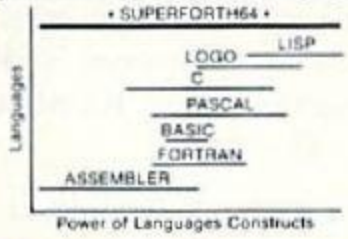

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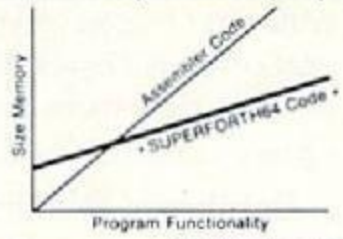

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C-64 Database

Computer People (PO Box 370, Chadds Ford, PA 19317) has released Filer, a database management system designed for the inexperienced user.

Filer helps you to design, create and manage the data in your files. You can add new data and modify or delete existing data. You can also change the file structure by adding or deleting data items without losing existing data. The list function allows you to select specific data from files and produce reports.

Filer is designed for ease of use; no knowledge of computers or programming is required. It is available on disk for the Commodore 64. Retail price is 49.88.

Check Reader Service number 420.

Financial Analyst

Excelsior Software Co., Inc. (Suite 507, 516 Fifth Ave., New York, NY 10036) has released Financial Analyst, a personal financial software package for the Commodore 64.

Financial Analyst contains five financial subprograms to help you manage your savings and loans more efficiently. A sixth subprogram enables you to review two financial records on each disk or cassette.

The program features daily and monthly compounding of interest for the popular money market accounts. The Financial Analyst program, including concise documentation, is available on disk or cassette for $34.95.

Check Reader Service number 431.

Portable Printer

Computer Peripherals, Inc. (6400 Canoga Ave., Suite 305, Woodland Hills, CA 91367) has introduced the Printelex printer model TH-40-160.

Weighing only 1.5 lbs., the Printelex is a hand-held printer with a speed of 160 characters per second. It uses thermal paper and supports the full 96 ASCII character set. Other features include upper- and lowercase and graphics capabilities, with 280 dots across.

The Printelex is available with cables allowing you to interface it with the C-64 or the VIC-20. Retail price is $157.50.

Check Reader Service number 429.

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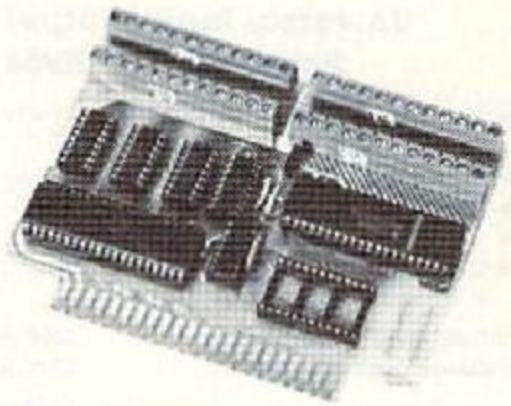

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Reading Growth Series

Reading Growth is a series of programs designed to improve the reading skills of learning-disabled children.

The series uses color and animation to improve the visual perception of children with reading problems. The programs form a system of 12 levels, teaching a sight-word vocabulary, comprehension and spelling.

The series is intended for students in the second through eighth grades, with increasing levels of difficulty based upon the student's performance. They can be used as part of a school reading curriculum or for home study with parental supervision.

The Reading Growth series is available for the Commodore 64 and the VIC-20 (with 3K expansion). Each level retails for $15 on disk and $12 on cassette. Wrenwood Software, PO Box 152, Imlay City, MI 48444.

Check Reader Service number 418.

Invoicing Package

The Invoicer is an invoicing program designed for wholesalers, retailers and small business owners who need a fast, inexpensive way to invoice orders and track sales.

The program prints on plain paper and blank or preprinted invoices. It will automatically track your tax, taxable sales and nontaxable sales. It will also track the number of invoices completed and the number of invoices voided.

Other features of the program include: automatic letterhead formatting, optional/automatic sales tax calculations, automatic line extension and totaling, optional invoice numbering, built-in audit controls, automatic form feed and daily sales reporting.

The Invoicer is available on disk for the Commodore 64. It retails for $39.95. MiccaSoft, 406 Windsor, New Braunfels, TX 78130.

Check Reader Service number 426.

Learn Touch Typing

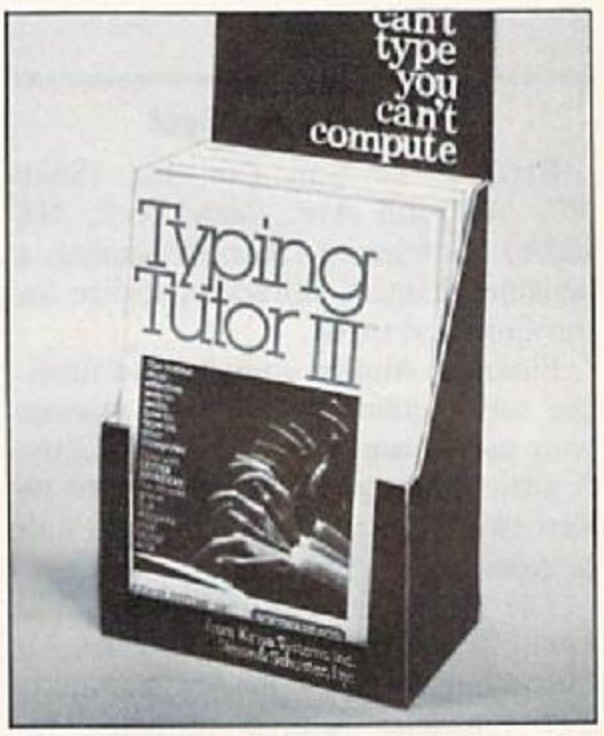
Simon & Schuster (1230 Avenue of the Americas, New York, NY 10020) has released Typing Tutor III, a touch-typing program for the Commodore 64.

Typing Tutor III is designed to accommodate the skill level and learning needs of the individual student. The program offers word and number tests, speed tests and a full keyboard test for experienced typists.

Bar charts display speed and accuracy improvements for each key. The package also includes Letter Invaders, an arcade-style game designed to develop speed and accuracy.

Typing Tutor III is available on disk for $49.95.

Check Reader Service number 401.



Telling Time

Gamco Industries, Inc. (PO Box 1911, Big Spring, TX 79720) has released Telling Time for the C-64.

The program offers guided drills in telling time. Students can choose from four different lessons. Questions are randomly generated, and students control the pace of the presentation. Robot Rescue, an arcade-style game, is offered as a reward for high scores.

For teachers, a student management system is included for keeping track of each student's performance. Files can be kept for up to 200 students.

Telling Time is available on disk for $39.95, or $54.95 with a backup disk. An abbreviated version of the program is available on cassette for $19.95.

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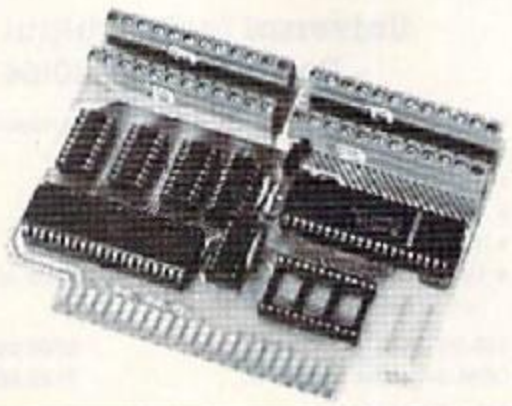

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Smartline Cables

Computer Accessories (7696 Formula Place, San Diego, CA 92121) has introduced the C600 and C601 Smartline Cables for the Commodore 64. The cables are designed to solve interfacing problems and allow the connection of popular parallel printers to the C-64.

Using a smartline cable, printers can reproduce text as it appears on-screen, without glitches. These cables allow you to use Anadex, Brother, C. Itoh, Epson, NEC, Okidata, Star Micronics, Transtar and other printers.

The C600 Smartline Cable is available for $69.95. The C601, complete with word processing and graphics software on cassette, retails for $99.95.

Check Reader Service number 430.

A Touch of CLAS

Touch Technologies (609 S. Escondido Blvd., Escondido, CA 92025) has released the Computerized Lesson Authoring System (CLAS), a software package that enables educators and parents to create their own courseware without prior computer experience.

CLAS can be used to teach a wide range of students (from elementary school children to college graduate students) anything from basic math and spelling to physics and technical writing. It can be used to teach a single lesson or an entire semester's course.

Once created, lessons can be used again to give quizzes, present new material or reinforce previously presented material. CLAS is available for the Commodore 64. The package, including an author's disk, a student disk and a user's guide, retails for $89.95.

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Blockade Runner

Blockade Runner puts you in command of a merchant space freighter. You must transport essential supplies to your home planet. This mission is complicated by alien fleets which force you into an asteroid belt.

You must steer clear of the asteroids, since each collision causes your protective deflector shields to grow hotter—the ship self-destructs when a critical temperature is exceeded.

Alien fleets send plasma blasts toward your ship. You can destroy the aliens by scoring three direct hits. Enemy robot mines must also be eliminated before they explode and cause severe damage to your shields.

Blockade Runner automatically adjusts to the skill level of each player. The better you are, the more difficult the trek. The game is suitable for one or two players.

Blockade Runner is available on cartridge for the Commodore 64. It retails for $36.95. Interphase Technologies, Inc., 6391-F Westminster Hwy., Richmond, BC V7C 4V4 Canada.

Check Reader Service number 413.

Letter-Quality Printer

Cardco, Inc. (300 S. Topeka, Wichita, KS 67202) has released the LQ/3 letter-quality daisy wheel printer.

Features of the LQ/3 include standard friction-feed and optional tractor-feed. Printing speed is 13 characters per second. The printer comes complete with built-in interfacing for the C-64 and the VIC-20.

The LQ/3 is available for $449.95.

Check Reader Service number 408.

Construct a Space Station

Project: Space Station is designed to give you an understanding of the intricacies involved in the construction and launching of a manned space station under real-life constraints and delays, such as budgeting problems, unfavorable media coverage and bad weather.

To successfully construct a space station, you must formulate a budget, schedule a launching date and choose the necessary equipment from a catalog, modifying and adding parts as necessary. You must then determine the space station's mission, select a crew, launch shuttles into orbit and assemble construction parts in space.

Time pressures and problems will arise, requiring you to make split-second decisions. Also, you'll have to travel to Washington, DC to appear before a U.S. Senate committee to argue for funding.

Project: Space Station is available on disk for the Commodore 64. It retails for $39.95. Human Engineered Software, 150 North Hill Drive, Brisbane, CA 94005.

Check Reader Service number 416.

Coming Next Month

The Basic language has always been a big favorite among Commodore owners because it is easy to learn and to use. But there are other languages available.

In the October issue of *RUN*, we will introduce readers to other choices, such as Logo, Comal, Pascal, Fortran and Pilot. The issue will include introductory articles on each of these languages to assist those readers who are looking for another language—besides Basic—to program.

In addition, the following articles are slated to appear in next month's issue:

—Mystery of Lane Manor
Who killed industrialist James Lane? You and your C-64 will have an opportunity to solve this murder mystery when you play this "who done it?" game. To solve the crime, you must piece together the evidence presented to name the murderer, the location of the crime and the weapon used.

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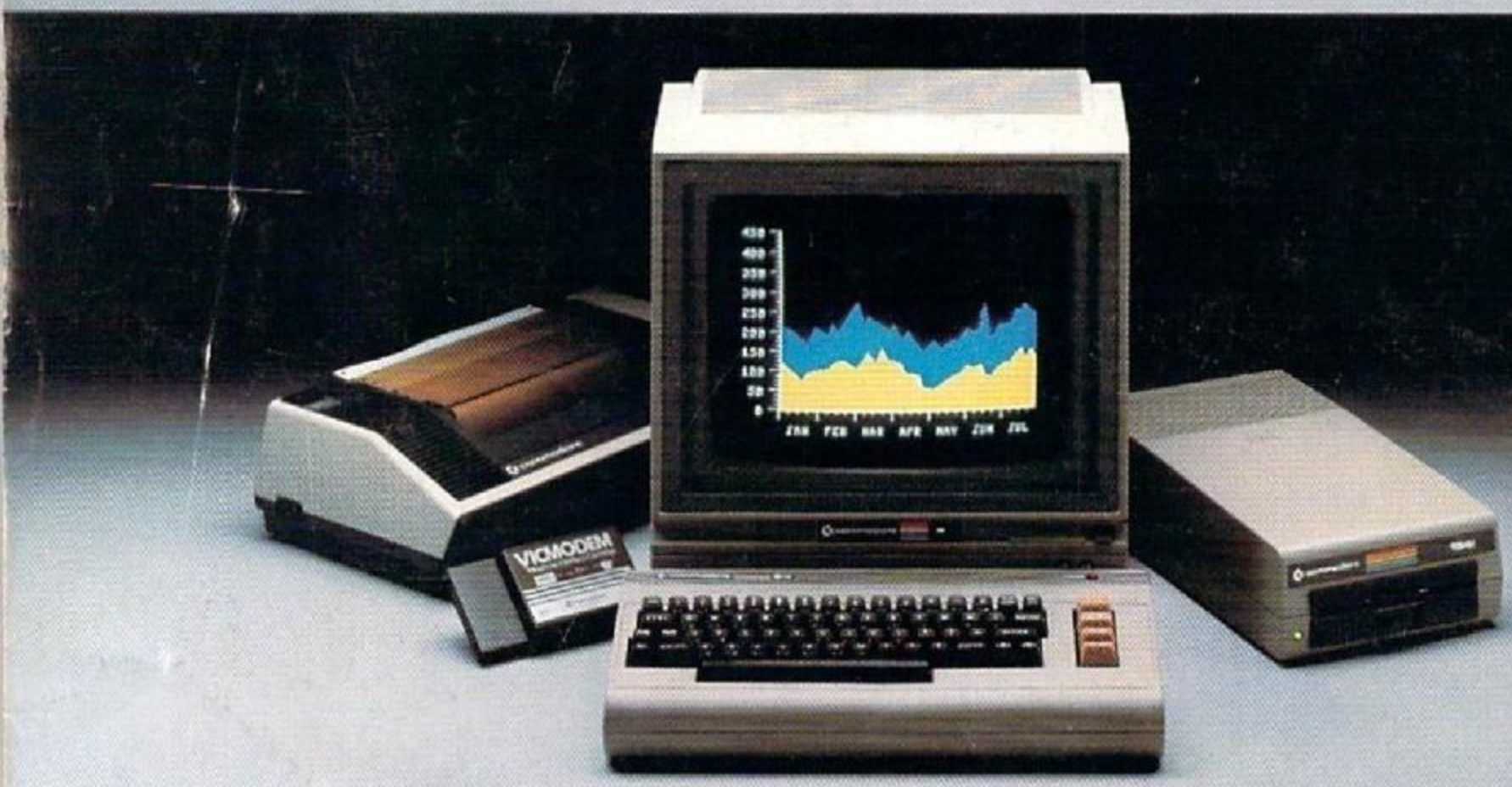

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